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Industrial Health Services

Last week, Sir Walter Monckton, Q.C., Minister of Labour and National Service, disclosed plans he had in mind for the stimulation of the development of industrial health services in workshops covered by the Factory Acts. The plans include the appointment of a standing Industrial Health Committee to advise the Minister; a review to find out where health services are most urgently needed, and the promotion of surveys and field investigations where further information is required to determine the need for preventive methods or research. The Minister paid a tribute to the work already done in industry both voluntarily and under the Factory Acts. It is germane to state here that the recent publication by the Council of Ironfounders of "Years of Endeavour"—which we commended to our readers, was particularly timely.

Sir Walter must have appreciated this and similar activities, for he said that the general aim would be to develop the industrial health services on a voluntary basis, though where necessary, and after consultation, he might invoke his statutory powers under the Factory Acts. The industrial health services envisaged seem to cover much the same ground as those which have been the subject of voluntary effort and factory legislation for the foundry industry. They include good environmental conditions—sanitation, heat, light, ventilation, atmosphere and cleanliness—at the place of work; protection against poisoning and disease arising from industrial processing; adequate medical and nursing supervision and first-aid. For this purpose, a new administrative Industrial Health Branch has been established in the Ministry.

It would appear that the foundry industry has little to be alarmed about from the impact of this new plan, rather do we imagine that other industries will be brought into line with what has already been enacted for ironfounding and is under consideration for the non-ferrous section of our industry. There is both a credit and debit side to the extension of social services, as on one hand their cost may decrease competitive power in export markets, but on the other, they may tend to reduce losses through ill-health and industrial accidents. Moreover, with a clean and healthy and tidy shop, costs are more easily ascertainable and it follows that intelligent management can more readily see where improvement can be made. We have yet to see any case where improving shop and factory conditions has landed a firm in Carey Street. Still, it is perfectly obvious that the smaller concerns cannot carry such a burden of overheads as is called for by existing provisions, let alone any additional ones brought about by the new plan. To be realistic, the provision of full-scale amenities for the smaller firms, would either double the area of the works or halve the manufacturing space. It is to be hoped that this aspect will be borne in mind by the Minister, because these small concerns make a very valuable contribution to national economy and many will—as they have in the past—grow to sizeable dimensions.

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Sheffield Metallurgists' Reunion

Thackeray Retires

The second reunion dinner of the Department of Metallurgy, University of Sheffield, held on November 12 was attended by nearly 200 "old boys," present students and lecturers, who wished to pay tribute to Thackeray (Mr. E. J. Thackeray), who retired on that day at the age of 65, after 50 years' service with the Department. It was pointed out by Mr. Gerard F. Young (Pro-Chancellor) at the dinner that he was always known as "Thackeray" to students and staff alike, and was a friend of them all.

Thackeray was appointed in 1904, at 10s. per week, as secretary to Prof. Arnold and subsequently served with Professors Desch, Andrew, and Quarrell. As Thackeray admitted during his short speech, he first had the monumental task of "anticipating the wishes of Prof. Arnold," remaining with him until his retirement in 1919. Of the present Faculty, he said it had never been "in such fine trim" as it was now under Prof. Quarrell.

Mr. F. H. Saniter, of The United Steel Companies, Limited, and president of the Sheffield Metallurgical Association, proposing the toast of "The Faculty," pointed out that over 50 per cent. of the staff of the Swinden Laboratories at Rotherham were "old boys" of the Department. Prof. F. C. Thompson, University of Manchester, who responded, has been for many years the external examiner for Sheffield metallurgical students; he is shortly to retire. Prof. A. G. Quarrell said that the response to the suggestion of a reunion dinner had been immediate and enthusiastic. Of those present, the first to qualify in metallurgy were Mr. P. B. Henshaw (1904), Mr. A. Allison (1905), and from then on every year was represented. Prof. J. Husband, who also was present, had been appointed lecturer in civil engineering at the University in 1892. Well-known industrialists and research men present included Dr. N. P. Allen, Dr. H. H. Burton, Dr. T. P. Colclough, Mr. L. K. Everitt, Dr. E. Gregory, Mr. G. E. Speight, and Dr. C. Sykes.

(*Continued in col.* 2)

Forty Years Ago

In the issue of the FOUNDRY TRADE JOURNAL for November, 1914, the Editor using possibly what was his first opportunity to write about the impact of war on the foundry industry and gave a splendid lead. He deplored the recent inability of the steelfounders to compete with overseas makers for the smaller types of castings. The sands used were not too good and he pleaded for an exchange of experiences and above all some fundamental research. [The present writer was at this time using a mixture of eight different types of sand in a steel foundry!] Amongst new companies registered were Western Foundries, Limited, with a capital £1,500 and M. and W. Glazebrook, the latter changing from an old-established partnership.

Notes from the Branches

Australia (Victoria)

The October meeting was devoted to listening to a paper by Dr. W. K. R. Lippert on "Noise and its Control in Industry." Last week the annual convention was held. There was a works visit on Thursday to Ronaldson Brothers & Tippett, Ballarat. The annual dinner and ladies' night was held last Friday at the Ascot Hotel, Melbourne.

Unusual Lighting

Nearly 1,000 specially-designed lighting fittings of an unusual nature have been installed in the new electronics research laboratory and drawing offices of Ferranti, Limited, Edinburgh, works (shown in the illustration), which were officially opened by H.R.H. the Duke of Edinburgh on October 11. The lighting fittings could not be fixed to the underside of the beams of the ceilings of these new premises as the metal and glass partitioning which divides the laboratory and drawing offices into sections fits closely under the beams and may be repositioned at any time to accommodate larger or smaller teams of workers on particular projects. At the same time, the fittings could not be secured to the actual ceilings because they incorporate panel heating equipment. To overcome this problem and to keep installation costs to a minimum, the Edison Swan Electric Company, Limited, in conjunction with Fairbrother, Hall & Hedges, the architects, evolved a special type of louvred "Perspex" diffuser fitting for side mounting on continuous channelling running along the side of the ceiling beams and on the walls. Each fitting houses one 5-ft., 80-w. fluorescent lamp, but they can be adapted at any time to two lamp-units, merely by adding extra control gear and lamp-holders. Similarly, the spacing between fittings can be altered by re-positioning on the channelling and re-fitting cover plates.

Shell Moulding and the Economic Use of Materials*

By Robert K. Jackson

[ABRIDGED]

On May 30, 1947, a Report was issued by the Field Information Agency, Technical United States Group Control Council for Germany (F.I.A.T. Final Report No. 1168) entitled "The 'C' Process of Making Molds and Cores for Foundry Use." The Report made public, details of a process for the production of moulds and cores being used in Germany in the latter stages of the War, and was the first publication to reveal the existence of such a process. This process is also known as the "Croning Process" but perhaps is better known as shell moulding.

Since the Report, a large amount of technical literature has been published, and the subject has been the cause of discussion between foundrymen throughout the world. Many foundries have tried and are trying the process on an experimental basis, a number producing small quantities of shell moulded castings daily, and a few larger firms have gone on to the mass production of shell moulded parts. One outstanding car manufacturing firm in the U.S.A. was said to be producing 1,000 alloy steel exhaust valves per day in late 1948, and at the present time is producing about 4,000 nodular cast iron crankshafts per day and the same number of camshafts by the shell-moulding method.

Process Outlined

The fundamental principles of the process have, as stated above, been well catered for both in the technical press and trade publications, and it is therefore the writer's intention to cover the main points in as few words as possible, yet still give a general picture of the process together with advantages and drawbacks.

From 5 to 8 per cent. of a thermosetting binder, usually a phenol-formaldehyde synthetic resin, is mixed with fine, clean, dry, clay-free silica sand having an A.F.S. fineness number between 90 and 230, usually 90 to 140. To this can be added a small percentage of a "wetting" agent to assist in the prevention of resin segregation. Mixing continues until the resin has obtained maximum distribution throughout the sand mass. The mixture is then invested (dumped or blown) on to a metal half-patternplate, which has been previously heated to such a temperature (200 to 285 deg. C.) as to melt the resin and cause it to flow round the sand grains.

After a short period, known as the "dwell period" (5 to 16 sec.) the patternplate is removed from the dry mixture; the sand containing the uncured resin falls away, leaving a thin, semi-cured shell adhering to the pattern. On application of further heat (260 deg. C. for 4 min. or 535 deg. C. for 20 sec.) the shell cures to a hard brittle structure producing an accurate reverse replica of the parent pattern. The shell is then removed from the patternplate, this being effected by the use of spring-loaded ejector pins of a similar nature to those used for the removal of die-castings from permanent moulds. The clean removal of the shell from the pattern is assisted by the use of stripping agents—usually of a silicone-oil base applied to the pattern before the investment takes place.

The cured half-shell is generally paired up with a similar half, so producing a complete mould. Some means of clamping is then used—packing in shot, glueing, D-clamps, etc.—to hold the mould halves together, and to minimize the distortion which takes place when metal enters the mould cavity. The shell must resist the metal pressure and remain stable until the metal has solidified.

The pattern must be of a superior finish and construction and free from low-melting-point solders. The whole of the pattern is generally produced from the same material to avoid distortion due to differences in thermal coefficient of expansion of differing metals. Grey cast iron is the most popular material for this purpose. The pattern should also embody the running system, feeders, core prints, some means of ejecting the shell as already mentioned, and have the necessary means of location of the two shell halves together (male and female location is the general practice). Running methods are not of the conventional type used in greensand moulding and bottom pouring is generally advised, many moulds being cast in the vertical position.

Advantages

The development of this process has continued at a rapid rate, and within a few years, there has come on to the market, a large range of resins, sands and release agents together with various types of shell-moulding machines, equipment and various other apparatus for the production of shell moulds. The advantages claimed by this method of moulding are both varied and considerable, and the following gives a fair idea of the extent of the advantages claimed:—

(1) More accurate castings are produced.
(2) Castings have a smoother skin and therefore a better appearance.
(3) Machining allowances can be reduced and in some cases be eliminated altogether.

* Prize-winning entry—Lancashire branch—in the competition organized by the Institute of British Foundrymen in connection with the Jubilee Celebrations.

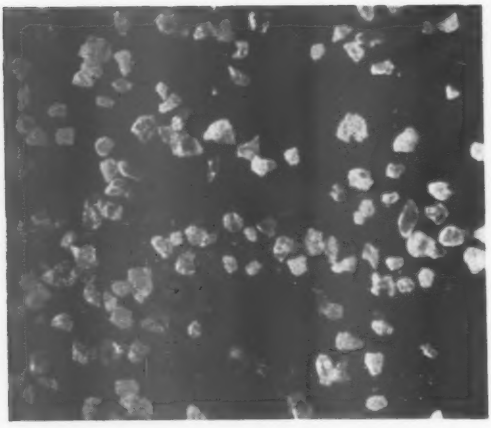


FIG. 1.—*Photomicrograph of "Redhill" (H) silica sand (x 20).*

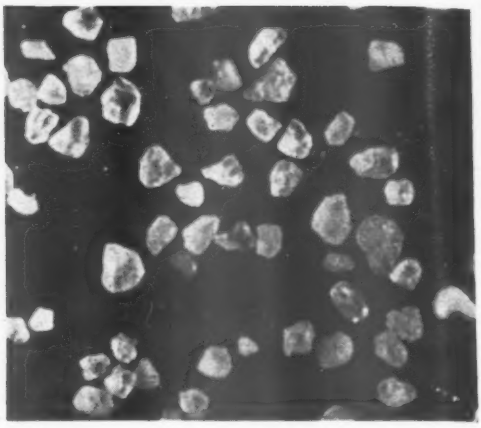


FIG. 2.—*Photomicrograph of "Southport" silica sand (x 20).*

(4) Castings of thinner section can be produced and those in grey cast iron has less tendency to chill. Castings normally produced in malleable iron can be cast in steel which, in green-sand moulds would otherwise be very difficult.

(5) The casting requires less cleaning and fettling.

(6) A larger yield of casting to metal poured is possible because runners and feeders can be reduced.

(7) There is less chance of defects such as swelling and cross-jointing, entrapped gases, blowholes—these being obviated by the strong structure and high-permeability of the mould and by reason of using moisture-free material wear on pins and bushes is obviated.

(8) Because of the rapid breakdown of the shell, there is less chance of cracks and hot-tears in the casting.

(9) Less fuel is used in melting the metal, as a lower casting temperature is used.

(10) As only about 5 per cent. by weight of sand is used compared with green-sand moulding, it follows that sand storage, handling and preparation plants can be reduced considerably, therefore increasing foundry space available.

(11) Knocking-out of the moulds is simplified, as there are no boxes and pins to handle and return, and none to maintain.

(12) Because of the small amount of sand used, sand reclamation is not essential, the waste material usually being dumped.

(13) Only new materials are used at the sand mill and therefore a more accurate control is possible.

(14) More moulds per square foot of foundry floor can be produced and cast.

(15) The moulds can be stored indefinitely and, because of their strength, stability and lightness, they are easily transported to any point, or any other factory. Storage space can be used to the full.

(16) Semi-skilled labour can be used for operating the process.

(17) The process lends itself to mechanization.

(18) As clean, dry materials are used, the process promotes a purer foundry atmosphere when using suitable ventilation, and better housekeeping is possible.

Limiting Factors

One of the main disadvantages, excluding the initial cost of pattern equipment and the high outlay for mechanized plant, is the very high material cost of resin and sand, the former being naturally the major item. The resin producers have given no promise of large reductions in price for the future as the raw materials themselves are expensive. It follows, therefore, that any reduction in the percentage incorporated should show a considerable saving. The percentage of resin used is dependent to a large extent on the sand used, in respect of its grain size, grain shape, absence of clay and the condition of the surface of the grain. There is little dispute, however, that with finer sand, a larger percentage of resin as binder is needed. It is possible to reduce the percentage of resin by increasing the grain size of the sand used, but as the fineness of casting finish is dependent to a large extent on fineness of the sand, this is not the answer to the problem.

TABLE I.—*Grain Size of Sands Used.*

	Redhill (H)	Southport.
Percentage retained on—		
B.S. Sieve No. 22	Nil	—
B.S. Sieve No. 30	0 02	—
B.S. Sieve No. 44	0 02	2.84
B.S. Sieve No. 60	0.30	26 04
B.S. Sieve No. 100	1.64	61.94
B.S. Sieve No. 150	23 08	8 98
B.S. Sieve No. 200	40 04	Trace
Passed through No. 200	34.90	0.20

TABLE II.—*Transverse Test Results on Resin/Sand Specimens.*

Percentage resin.	Five.		Six.		Seven.		Eight.	
	Lb.	Deflection.	Lb.	Deflection.	Lb.	Deflection.	Lb.	Deflection.
Redhill (H)—								
1	8.5	0.04	10.25	0.04	10.5	0.04	12.0	0.03
2	7.5	0.04	10.0	0.03	9.0	0.03	11.5	0.03
3	8.0	0.04	10.0	0.03	9.0	0.03	12.0	0.03
4	8.0	0.04	9.0	0.04	11.0	0.03	13.0	0.03
5	6.0	0.03	8.0	0.04	8.5	0.03	13.0	0.04
6	6.0	0.03	6.0	0.03	5.0	0.03	11.5	0.03
Southport Sand—								
1	11.0	0.03	14.0	0.03	15.0	0.03	17.0	0.03
2	12.0	0.03	12.0	0.03	14.0	0.02	17.0	0.03
3	12.0	0.03	14.0	0.03	14.0	0.04	15.0	0.03
4	11.0	0.03	14.0	0.03	15.0	0.04	14.0	0.03
5	12.0	0.03	14.0	0.03	—	—	16.0	0.03
6	11.0	0.03	14.0	0.03	16.0	0.03	16.0	0.03

Much work has been done in blending sands of different grain size, and therefore cheapening the total cost of the sand, but it would seem that the more blending which takes place, *i.e.*, the larger the percentage of coarse sand added, the rougher will be the casting, and the amount of smoothness which is obtained will then depend on how much the casting producer is prepared to pay, *i.e.*, finer sand—smoother casting—higher price for the finer sand/resin mix.

The Author carried out a number of experiments using both Redhill (H) and Southport sea sands with varying percentages of resin. Table I shows the sieve analysis of the two sands used, and Figs. 1 and 2 show photomicrographs of the two sands, from which it will be noted that the Redhill sand is considerably finer.

Three kilograms of each of the two sands were mixed separately with resin percentages of 5, 6, 7 and 8. From the sand mixtures, test-pieces were made from a split cast-iron corebox 6 in. by 1¼ in. by ½ in. The box was pre-heated to a temperature of 220° C., the resin/sand mixture poured in, and the excess strickled off. These were then cured for 3 min., again at 220° C. Stripping was aided by the use of silicone oil. (See Fig. 3.) Six test-pieces were made from each of the mixtures and allowed to cool, then broken under transverse, the test-piece being supported at each end (Fig. 4). The breaking point was recorded in lb. and the deflection was also measured. The results are shown in Table II.

From Table II it will be seen that supposing a strength of 11.5 to 12 lb. is necessary to obtain a shell with sufficient strength to withstand molten metal, and produce sound castings, a resin content of 8 per cent. will be necessary if Redhill (H) sand is used. If Southport Sand is used however, a resin content of only 5 per cent. is necessary. Table III shows the relative costs in the Lancashire area.

It should be noted that the nominal resin percentages shown in Table III are not correct, as it will be seen that as the resin was added to 100 parts of sand, this would reduce the percentage of resin in the same. The actual percentage of resin is shown in brackets and the costs are based on the cost of the actual percentage of resin, together with 1 lb. of sand.

From these considerations, it is clear that some thought should be given to means of finding a method to use sand of larger grain, but still producing a casting having a good skin.

Double Investment

Some very considerable savings can be made by using double investment of the pattern with

FIG. 3.—*Corebox, test-piece, and broken specimen as used in testing shell-moulding sand mixtures.*

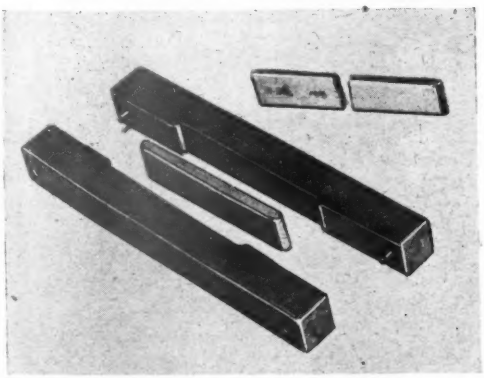


FIG. 4.—*Method of breaking a resin/sand test-piece.*

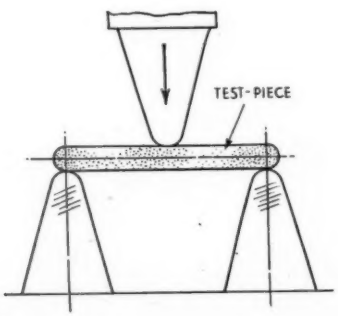


TABLE III.—*Relative Costs (in(pence) of Various Sand Mixtures.*

Percentage resin.	Resin cost per lb. of shell material.	Resin and 1 lb. of Redhill (H) sand cost.	Resin and 1 lb. of Southport sand cost.
Nominally 5 (4.76)	1.57	2.11	1.65
Nominally 6 (5.66)	1.86	2.4	1.94
Nominally 7 (6.542)	2.158	2.698	2.238
Nominally 8 (7.4)	2.44	2.98	2.52

sand/resin mixtures of different sands and resin percentages, instead of a single investment, as is normal practice. In the first dump-box, a very fine silica sand would be used, say, Redhill (H) together with a percentage of resin which would normally produce a shell with a superior smoothness and necessary strength. In the second investment box there would be a coarse, less-expensive sand such as Southport. This would contain a lower resin percentage but sufficient to give the shell adequate strength. The moulding cycle with the two investment boxes would be as follows:—

(1) Heat the pattern.

(2) Clamp the pattern on the first dump-box and allow a dwell period to take place for only a fraction of the time normally given, say 2 sec.—depending on pattern temperature etc.—thus producing a very thin shell.

(3) Remove pattern.

(4) Clamp the pattern on to the second dump-box and re-invest it with the cheaper mix. The dwell period would be then of such duration as to produce the required shell thickness.

(5) Cure and strip the shell in normal way.

The resulting shell would have the required smoothness in the mould cavity to produce a fine casting surface, yet would use only the bare minimum amount of expensive material, and be backed with a coarser grained, less-expensive mixture of sand and resin (see Fig. 5).

This procedure is of a similar nature to the use of facing sand in normal green-sand moulding, where it is often better to utilize a more expensive sand and use this as a facing in order to obtain the required results in skin finish, etc. on the casting (Figs. 6 to 8).

Cost Example

A shell 14 in. by 18 in. by 5/16 in. thick weighs 5 lb. and it will be seen from Table III that the cost of the shell would be 14.9d. if Redhill (H) sand and 8 per cent. resin were used, but if double investment were carried out and 1/16 in. of the shell were of Redhill (H) and the remaining ¼ in. composed of Southport sand, and 5 per cent. resin, the cost would be 9.58d.—a saving of 5.32d. per half shell, or about 10½d. per mould. The thickness is only given as an example for costing. It is obvious that 1/16 in. thickness of fine sand can be reduced as it is only necessary to cover the pattern with a thin film of the fine material.

It is true though, that extra time is necessary for the double investment—*i.e.*, de-clamping, removal of pattern, re-clamping and re-investing—if the hand method of shell production be used, thereby increasing the labour costs of the process. There would then not be the same saving as at first envisaged. However, double investment of patterns could quite easily be incorporated in shell-moulding machines and become part of the machine's cycle.

A dump-box might easily be so designed as to invest the pattern first with the fine mix, and then after reversing to invest the pattern with the coarser and less-expensive mixture. Using the double investment technique with mass-production shell moulding should show considerable saving.

Clamping

The question of clamping the two shell-halves together is, it is thought, closely tied up with the

FIG. 5.—*Section through a double-invested shell mould (x 12).*

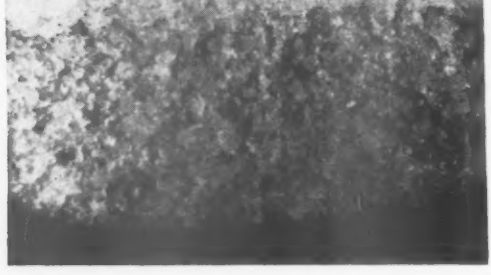
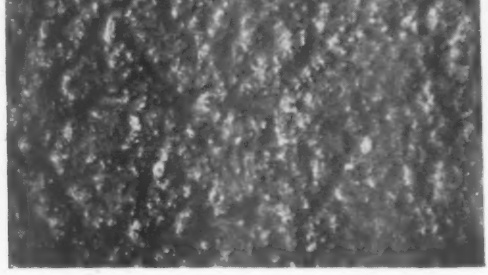


FIG. 6.—*Casting finish obtained by using "Southport" silica sand (x 12).*



thickness of the shell and therefore, the amount of mould material used. It is claimed that if the moulds are packed in metal shot or other material, a much thinner shell can be used and therefore the cost per shell, as far as the mould material is concerned, is considerably less. One must, however, realize that extra equipment is necessary, such as, mould containers, vibrators, larger mould conveyors and metal shot. To this must be added the fact that this equipment has to be handled, the metal shot cooled for re-use and, in the case of a run out, there is the additional expense of shot replacement. The Author considers a more constructive approach to clamping is made by the adoption of some mechanical means on similar lines to the method developed by the British Cast Iron Research Association. This method, used as a multiple-station roundabout type of unit could have positions for closing, casting, cooling and knocking out. It would be a compact machine and the problem of high cost of resin could then be attacked by using double-investment or some similar method.

Conclusion

The Author is aware that foundrymen do not stand alone as metal-shape producers and that competition exists between them and the personnel of fabricating and forging industries, and to a certain extent, those of the plastics industry. The foundryman should therefore be always ready to develop and use new methods in order that he can produce a product superior in quality and more economical in price than other manufacturers.

The Author has considered shell moulding as a means to this end, giving an outline of the process and showing advantages in detail. He has also tried to show a practical method of reducing the high resin and sand cost. It is his opinion that shell moulding is not the "be all and end all" of casting production, nor does he think that the majority of castings will, in the future be made by this method. However, it is believed that the process will take its place as another method of producing castings and assisting the founder in a competitive world market.

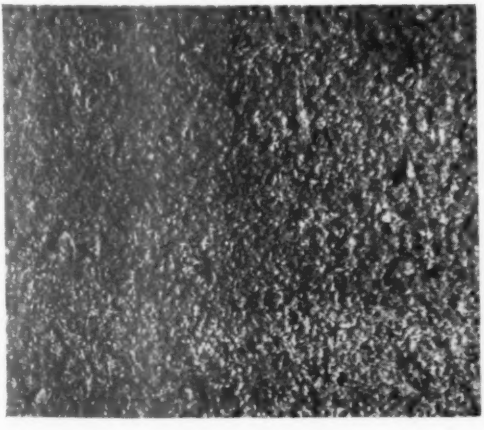
The foundryman has been given a new and interesting process to help him not only to keep his present customers, but also to make new ones, and perhaps bring back some who have been lost. The amount to be gained by correct and intelligent use of the process is great, but to abuse it can also prove very expensive. Shell moulding, like any other type of moulding, has its limitations, though the range of castings which can be produced by the method is ever increasing. This does not mean that because a casting can be made in this way that it is the correct method for producing it. Only after careful study of each individual type of casting should a decision be reached, considering the amount to be saved due to less machining, better casting appearance, promoting greater "saleability" and all other advantages.

It would be absurd to mount a small "one-off" green-sand job on to a metal patternplate for production on a fully-mechanized plant, and it would be equally absurd to produce by the shell-moulding method castings requiring no machining and needing no super-finish. Many castings used in the building trade, such as firebars, grates, earth pipes, etc., are typical examples.

FIG. 7.—*Casting finish obtained by using "Redhill" (H) silica sand (x 12).*

FIG. 8.—*Casting finish obtained by using the double investment with "Redhill" (H) and "Southport" silica sand (x 12).*

Note: It may appear that Figs. 7 and 8 show casting finishes of the same order, though the finish seen in Fig. 8 seems superior to that of Fig. 7. This may be due to the fact that after investing the pattern with the fine sand for a short dwell period, the coarser mixture was then invested on to the pattern and might have produced a packing action on the thin skin of the fine sand. Thus a more tightly packed mould surface would be obtained and therefore a finer casting finish than that obtained by using all "Redhill" (H) sand.



New Engineering Pay Claims

A claim for more pay is to be presented by the Confederation of Shipbuilding and Engineering Unions to the employers at a conference in London on December 14, according to an announcement at a meeting of the Executive Council of the confederation in York recently. After the meeting Mr. G. Martin, general secretary of the confederation, said that arrangements were going ahead with a view to fixing a conference with the shipbuilding employers for the purpose of presenting a pay claim to them, too.

In the two industries nearly 3,000,000 workers are involved in the claims, which are for an increase of from 10s. to 15s. a week for both unskilled and skilled workers. If the claims are granted it will add a further £1,000,000 to the wages bill.

A claim that the minimum rate for women in the engineering industry should be not less than the labourer's rate for men was presented by the unions catering for women engineers to the Engineering and Allied Employers' National Federation on November 10. The women's present rate of pay is 97s. 2d. and that of the labourers 124s. 10d., so that the claim would mean an increase of 27s. 8d. a week in addition to any increase which the labourers may obtain as a result of the negotiations which will begin next month on the men's claim. The number of women affected by the claim is about 400,000.

Thomas & Clement, Limited

In connection with the announcement of the liquidation of Thomas & Clement, Limited, the old-established Llanelly engineering firm, a statement issued on behalf of the parent company, Glanmorfa, Limited, makes it clear that it will have no effect on the local employment situation. Glanmorfa, Limited, is the owner of Thomas & Clement, Limited, and also of the Glanmor Foundry Company, Limited. For purely administrative reasons Thomas & Clement, Limited, is being put into voluntary liquidation in order to centralize the administrative and technical organization of the Glanmor Foundry. In effect, the liquidation will involve a change in name only, production at the Morfa Engineering Works, formerly of Thomas & Clement, Limited, will continue as hitherto and involve the same personnel.

It is understood that the liquidation of the company, which now merges its identity with that of the Glanmor Foundry Company, Limited, was contemplated before the war upon the formation of the parent company. The process was, however, postponed by the advent of war and subsequently other delaying circumstances arose.

B.S.I. Information

The British Standards Institution *Information Sheet* for October, 1954, lists amongst "Amendment Slips Issued, 991: 1941 Data on cast iron. Amendment No. 1, PD 1977, and amongst "Reprints" 592: 1950, Carbon steel castings for general engineering purposes. 2s. 6d. From Spain, standards for light aluminium alloys for castings, Nos. 38212—Al-Cu-8; 38213—Al-Cu-Zn-7; 38214, Al-Cu-Ti-4.5; 38215—Al-Cu-Ni-4 have been received. Among the draft standards received from Commonwealth Countries are EDC 4(224) High purity zinc and zinc-base alloy ingots for die casting; and EDC 4(225) Zinc-base alloy die castings.

Company News

PETER BROTHERHOOD, LIMITED, plant and machinery maufacturers, of Peterborough—Application is being made to the C.I.C. for a one-for-one scrip issue.

STAVELEY COAL & IRON COMPANY, LIMITED—Given a continuance of present trading conditions, the directors expect that a satisfactory level of profits can be maintained, but there is a real need for stability in costs.

BRUSH GROUP, LIMITED (formerly the Brush Electrical Engineering Company, Limited)—The directors are resuming interim dividends on the £2,400,000 ordinary stock with the payment of 3 per cent., less tax, in respect of 1954. A single payment of 6 per cent. was made for 1953, compared with an interim only of 4 per cent. for 1952.

GEORGE COHEN, SONS & COMPANY, LIMITED—The directors announce that in connection with the offer to ordinary and preference stockholders of the company, of £1,000,000 4¼ per cent. unsecured loan stock, 1965/70, at £97 per cent., applications have been received for approximately £33,000,000 of stock. Every applicant has received an allotment and preference has been given to smaller applications as far as possible.

PICKFORD HOLLAND GROUP—refractory product makers, report record trading profits of £168,000 in the period June 27, 1953, to June 27, 1954. This compares with £143,000. The distribution already announced was equivalent to 12 per cent. on a larger capital. Mr. R. R. Steel, chairman of the company, states that the outlook is promising if the group's two main customers, the steel trade and the coke-oven industry, remain as busy as they are at present.

PETROCHEMICALS, LIMITED—The board is giving serious consideration to a complete capital reconstruction. The past year's trading has resulted in a profit of £793,345, against £170,660, and after depreciation, etc., there is a surplus of £127,699 attributable to the parent company, compared with a previous deficit of £439,794. There are, however, interest payments of £382,000 (£381,399) due but not paid which, with the taxation charge and outside interests, leave the final deficit at £319,263 (£858,286).

ACROW (ENGINEERS), LIMITED—Despite an increase from £372,067 to £430.456 in untaxed profits and a record turnover for the year ended March 31, the final dividend on the present £300,000 privately held ordinary capital is again limited to 10 per cent., with a view to financing out of revenue the extension to the head office, now nearing completion, and the building of the No. 3 works at Saffron Walden. An unchanged interim dividend of 20 per cent. has already been paid on the £250,000 ordinary capital existing before the 20 per cent. scrip issue made last March.

DAVID BROWN CORPORATION, LIMITED—The board announces that it has received inadequate acceptances of its offer to purchase the ordinary and preference shares of Harrison, McGregor & Guest, Limited, general engineers, ironfounders, etc., of Leigh (Lancs). The conditional contract entered into between the two companies is therefore no longer effective. The offer, of 12s. in cash for each 5 per cent. £1 preference share and 4s. for each £1 ordinary share, was recommended for acceptance by the board of Harrison, McGregor & Guest and was conditional upon acceptance by the holders of 90 per cent. of each class of share, or such lower percentage as David Brown Corporation accepted.

OIL has been struck again at Plungar (Leics), where the D'Arcy Exploration Company, Limited, has been boring since oil was found in commercial quantities last year.

Control

Mr. J. L. Francis' Presidential Address

Introducing his presidential address to Birmingham, Coventry and West Midlands branch of the Institute of British Foundrymen, Mr. J. L. Francis said that rather than attempt to find an original theme, he had selected one of perennial interest to all foundrymen. It dealt with defective castings and the application of control, in all its many aspects, as a means of reducing them. What follows is a report of his remarks:—

Waster Castings

In foundries, the world over, waster castings continue to be made and mostly for the same old reasons. Through the years, the knowledge and experience gained about causes of defects in castings should have, by now, largely overcome their occurrence. Many of the conditions necessary to avoid trouble are known. Usually, it is less costly to prevent trouble than to put matters right afterwards. Taking steps to ensure that every casting made is a good one is the greatest contribution to production anyone can make.

Present Knowledge

Much published data exist concerning the factors which operate to cause casting defects and additional knowledge is continuously being obtained. In this country alone there is the work of the Institute's technical sub-committees; also the valuable contributions of the British Cast Iron Research Association and the British Non-Ferrous Metals Research Association. Then, too, there are the research and development organizations dealing solely with aluminium, copper, lead, nickel, tin and zinc. Similar activities go on in other countries and so the pool of knowledge grows. One of the latest additions to it is the discovery of the influence of pH value on the properties of moulding-sand mixtures.

Multiple Causes

Once the factor, or factors, causing a defect become known, it is necessary to devise a means of control. Many techniques and procedures of this kind are available. Unfortunately, it is seldom that one single factor alone is responsible for any given defect. So the matter becomes complicated. For example, the A.F.S. "Analysis of Casting Defects" records 30 kinds of defect and 11 operating factors. Each operating factor can exert an influence on more than one defect. In fact, the lowest number of defect types attributed to any single factor is 12, whilst the highest is 25. Similarly, most defects are affected by more than one contributory factor. The same chart shows that for five different kinds of defect each can have 11 influencing factors. Only for two instances out of 30 is the cause of defect restricted to a single operating factor.

Combination of Influences

Most foundrymen have had foundry troubles which appear mysteriously and eventually disappear in like manner. The mystery is caused by uncontrolled and maybe unconsidered variables. Left to operate fortuitously, a time comes when a number of adverse factors develop sufficiently to make their combined influence felt. When they augment each other in this way the position becomes critical and the quantity of waster castings is higher than normal. Even if no action be taken to improve the situation, it will, quite likely, get better of its own accord. The same lack of control which allowed matters to reach a climax will fail to maintain it, the causative factors will alter and "break step," tending to counteract their individual effects rather than unite them.

In such circumstances no real knowledge is gained of the cause of the defects. After a time, a similar thing happens again because nothing is done to prevent it. Where control of operations and procedures is lacking and standard methods of working not applied, it is not possible to tell what changes in practice occur, nor when they happen. Therefore, any remedial measures which may be put in hand will be based on hope and guesswork.

Control all Relevant Variables

It is plainly asking for trouble to rely on chance in this way. There is no doubt that ignorance and/or neglect to apply control is a fundamental cause of wasters. Therefore, emphasis must be given to the importance of exercising control over all variables which can influence the production of sound castings. Already the list of known factors is long and doubtless some yet remain to be discovered. The pH value as affecting moulding sand properties has been mentioned and work is in progress to discover the effect of gases present in cast iron. Not all these are amenable to practical control, but many are and should be prevented from operating haphazardly.

The control advocated is extensive and varied. It ranks from a simple thing like weighing metal charges for the cupola to the determination of how best to gate and feed castings by a study of their radiographs. Obviously, the kind and degree of control which is expedient and possible will vary in different foundries. There can be no justification for not weighing cupola charges, but data collected by the Research Association shows that 34 per cent. of foundries visited have neglected to do it. Every foundry should exercise as much control as possible, consistent with its production. It is an economical and financial asset to do so because it results in less waster castings at one end of the scale and in saving of expensive raw materials at the other.

H

Control—Presidential Address

Guessing is Expensive

Founding is an important part of engineering. Progress and manufacture would be seriously impeded without castings. Therefore, as founding is so closely allied to engineering, it is surprising that the precise and scientific methods of the latter have not ousted more of the elements of guessing and chance which are still allowed to enter founding activities. Machine-shops make full use of micrometers, gauges, precision instruments, and all forms of appliance to ensure accuracy and eliminate human error. On the other hand, in many foundries, runners and gates are still cut out by trowel to the moulder's judgment and placed where he thinks fit or can put them most easily. Likewise, cases exist where little care is given to sand mixing and tempering. Similarly, make up of metal charges, melting, fluxing and pouring techniques are too often left to the discretion of operatives without issuing of proper instructions. These men may be replaced frequently or they may delegate their duties to others to whom they impart their method of working by word of mouth. Whenever a new man takes over, he should receive the same standard instructions in a form to which he can refer as often as required. There can then be no argument as to procedure or good reason for deviating from lines laid down.

Equipment for control and measurement costs money and requires effort and attention in use. Quite often it involves the engaging of additional personnel. Even so, it enables desired results to be achieved and reproduced as often as needed. Some aspects of control are relatively simple, demanding no special resources. In fact they can be included under the heading of plain common-sense precautions. Surely, it is better to spend money on means for increasing the output of sound castings than to expend it in replacing wasters without assurance that the replacement will be any better? Correct results are obtained only fortuitously by guesswork and by such means it is not possible to record precise instructions, so that a different operator can take over without risk or hazard.

Losses caused by guessing far exceed the cost of putting methods of control into practice. A little reflection will soon establish this fact, although control expenses are directly available, whilst those arising from waster castings are more difficult to ascertain, as they may involve time, handling, raw materials, useless machining and loss of customers' good will.

Cause Suggests Cure

If the reason for a casting turning out defective is known with certainty, the problem of how to avoid its repetition is well towards being solved. Control of all relevant factors in production, or as many of them as possible, helps tremendously in pin-pointing the cause. On the other hand, a " by guess and by God " procedure renders diagnosis difficult and further indulgence in such hit and miss methods may have to be made. Overcoming trouble in this way usually takes a much longer time.

Melting Control

As all casting operations involve the use of molten metals or alloys, control of melting procedures should be a prime consideration. In practice, they are subject to much ignorance and neglect although the correct techniques for obtaining optimum results have been developed and are readily available for all ferrous, non-ferrous and light casting alloys.

Non-ferrous and light alloys, particularly, are prone to gas absorption. The tendency to dissolve gas increases as the superheating temperature rises and with the length of time during which they are held molten. Thus, minimum temperature commensurate with the required degree of fluidity should be used and the time to attain it kept as short as possible. Simple degassing operations have been established and should be used wherever possible.

Temperature Measurement

Variation of pouring temperature has a big influence on the properties of non-ferrous and light casting alloys. When it is too high, defects due to shrinkage, dissolved gases and coarse crystallization are prevalent. Too low a pouring temperature encourages mis-running and entrapment of mould and core gases. A pyrometer for temperature measurement is a relatively inexpensive tool, the cost of which can be recovered in preventing the loss of a single important casting. Despite the undoubted truth of this statement much valuable metal and many expensive castings continue to be poured without temperature control of any kind save that of human judgment.

Sand Conditioning

Many waster castings are due to lack of suitable sand properties. Again, sand is a fundamental material in casting production. Nowadays, a very great deal of knowledge has been accumulated about the qualities which sand should possess for any given aspect of mould or coremaking. Moreover, the means of imparting and maintaining these characteristics are readily obtainable. The use of this knowledge is not as widespread and thorough as it should be, for if it were there would be many fewer castings rejected due to sand defects.

The regulation of sand processing results in an immediate saving in cost of materials, especially where oil-bonded sands are concerned. Costly oil is often used in excessive amounts when precise instructions are lacking and measuring equipment is not provided or maintained in efficient condition.

Gating and Feeding

Incorrect running, gating and feeding are responsible for a considerable proportion of the total of scrapped castings. Much has yet to be learned of these matters before they can be classed as a science. Even so, progress has been made and recorded for study. The principle of directional solidification is well known and understood, but it is too often disregarded. Films showing metal actually flowing into mould cavities, such as that of I.B.F. sub-committee T.S.35 and the ones produced by the United

States Naval Research Department, throw much light on the subject and correct some erroneous concepts about the functioning of multiple finger and step gating. Johnson, Bishop and Pellini in their work on "gating factors" have described how molten metal behaves in traversing different gating systems when dimensions are varied and bends and chokes introduced.

During recent years, a number of practical papers on the feeding of castings have been presented to the Institute which increase the knowledge in this field. Data have been given about insulated and exothermic feeding which not only reduce the chances of defects from this cause, but at the same time allow a higher yield of castings due to reduced size of feeders and lessen the work of fettling. The members of I.B.F. sub-committee T.S. 49 are at present investigating methods of improving the feeding of castings.

Mechanization

Arguments in favour and against mechanization have been waged without reaching finality. There is, however, one indisputable advantage which mechanized working bestows. It does exert control, together with a large measure of precision and standardization of techniques and processes. In other words, it ensures that well-thought-out methods and practices are established and carried out continuously, without alteration, as long as required, irrespective of change of personnel and the vagaries of the human element.

Increased Production

Even in these more enlightened days, a surprising amount of apparent indifference exists towards applying control in the foundry industry. To-day, increased production and reduction of waste in time, material and effort are of paramount importance to this country. Only a few practical examples, which come readily to mind have been mentioned. If they serve to focus more attention on this vital feature of control they will have fulfilled a useful purpose.

As Mr. E. Longden pointed out in his presidential address at the Blackpool conference of 1953: "There is a great accumulation of scientific knowledge, much of which is not being used advantageously, if at all, by the operative craftsman. The improvement in craftsmanship depends to a large extent, on its ability to absorb scientific and technological discoveries, mechanical developments and a willingness to accept a scientific organization of production. It is a significant fact that in the U.S.A., where productivity, measured in output per man/hour, continues to increase, the proportion of scientists and technologists in industry is also increasing. Science and technology, it seems, are the pathfinders to industrial efficiency."

HARRISON (BIRMINGHAM), LIMITED, Bradford Street Works, Birmingham, 12. have changed their telephone number to VICtoria 3421.

New Catalogues

Louvred Roof Ventilators. A leaflet received from Standard and Pochin Brothers, Limited, Evington Valley Road, Leicester, illustrates and describes a louvred-roof ventilator, which instead of relying upon external and internal temperature and wind action, incorporates a fan so as to ensure positive action. It is known as "Lextra." The leaflet is available to readers on writing to Leicester.

Resistance Grids. A leaflet received from John Harper & Company Limited, Albion Works, Willenhall (Staffs.), describes and illustrates a line of cast-iron resistance grids. No fewer than 50 standard patterns are stocked to make castings weighing from 1½ to 19 lb. This has been a regular line of production at Willenhall since before the 1914 war. Although it was thought, when laminated pressings entered the field, that production would be materially lowered, yet current output is higher than ever. Included in the leaflet is a table giving the capacity of various grids. Excellent use has been made of simple colour-printing.

Electric Furnaces. Three new leaflets and brochures received from Birlec, Limited, Tyburn Road, Birmingham, deal with: the new standard RS range of toolroom furnaces; the V.F.C. (vertical forced air-circulation) furnaces for heat-treatment operations up to 700 deg. C. induction melting; and Birlec Tama low-frequency, induction, melting furnaces. The new standard RS model is a development of the Birlec RP and SA furnaces which have for over 20 years provided the metal industries with reliable heat-treatment batch units for working temperatures of up to 1,050 deg. C. As the name implies, the V.F.C. furnaces are of the vertical-cylinder type, enabling heavy charges to be handled easily and quickly by overhead crane or hoist. The induction melting brochure, which is an excellent example of business literature, outlines technical, practical and economic factors and constructional and operating details. These publications are avaliable to readers on application to Birlec, Limited.

Electric Hoists. The Clayton Crane and Hoist Company Limited, Irwell Chambers, Union Street, Liverpool, 2, have recently issued two catalogues, numbers 488 B and 491 B. Whilst the former is much more comprehensive, the latter is of especial interest to foundries as it is entirely devoted to electric hoists with micro-speed hoisting and travelling. In the past it used to be taken for granted that to ensure a creep lift, direct current must be used. New developments are such that alternating current can replace direct with every confidence. Most information is contained in the larger of the two leaflets, which runs to about 40 well-illustrated pages and is specially bound. A full technical description is given of the hoists; many typical installations, including a number of foundries, are illustrated. and 30 views in the makers' works are reproduced. From the user's point of view, however, value derives from an illustrated and numbered spare-parts list. Another service included, capable of minimizing much letter-writing is a questionnaire covering all essentials for provision of an estimate. These two catalogues are available to readers writing to Irwell Chambers.

THE EIGHTH CANADIAN International Trade Fair, sponsored by the Canadian Government, will be held in Toronto, May 30 to June 10, 1955.

Sulfinuz Process*

"Sulfinuzation" is the term applied to a sulphur cementation process, introduced by the Société d'Application des Traitements de Surface, which has been under development in France since 1947. A British Patent was published in 1950. The S.A.T.S. has assigned the rights for the Paris district to the firm of Partiot: the U.K. rights have now been acquired by Imperial Chemical Industries, Limited.

The mechanism of the Sulfinuz process, and the nature of the surface layer produced by it are not yet fully understood. It produces a self-lubricating, wear-resistant surface on iron and steel, without increasing the hardness of the metal. It is the culmination of efforts to produce a permanent sulphurized surface instead of interposing sulphur-containing lubricants between rubbing surfaces.

The parts to be sulphurized are placed in a bath composed of salts of low melting point: the active part of the bath consists of a salt of which the chemical composition includes one sulphur molecule incompletely oxidized.

The castings are immersed in this bath for periods varying from 30 min. to 3 hours, according to size and type of casting, and treated at a temperature of about 560 deg. C. The Partiot plant uses pot furnaces in refractory pits for sulphurizing parts, a 12-in. dia. furnace for small castings and a furnace 24-in. dia. for large ones. The furnace pits are heated by automatically-controlled electric-resistance heaters, or, in the case of the large furnace, by gas. The composition and temperature of the bath require very careful control; both are checked and adjusted, if necessary, for each fresh batch of castings. The bath is also kept covered to prevent rapid oxidation of sulphur-containing additions. The pots themselves are made of mild steel with aluminium-sprayed external surfaces. The supports corrode very rapidly and require frequent renewal. When the treated parts are taken out of the bath they are covered with a fine powdery layer which can be easily removed by brushing. A final oiling leaves them with a black finish. The true sulphurized layer underneath has a granular surface, grain size varying according to duration of treatment. This granular surface contributes to the lubricating effect when two sulphurized surfaces are in frictional contact. The sulphur impregnates the surface of the metal, and as it wears away, continues to penetrate. In a special test on unlubricated cast-iron journals, run dry for 5 hours at an average speed of 10 m.p.h., the journals did not seize. Sulphurized parts increase very slightly in size after treatment; the increase, even in large castings, does not much exceed 0.01 mm. in diameter. Castings which have to be produced to very close tolerances can receive a variant of the standard treatment.

Suitable applications for the Sulfinuz process are piston rings, cylinder liners, cutting tools, and journal bearings for rolls. The Partiot plant is treating cylinder liners for automobile and Diesel engines as well as valve rockers for stationary engines.

In addition to tests carried out and reported in France, by the inventors, tests have been performed in England by the Nuffield Central Research Laboratory and Wellworthy, Limited. The latter have compared the wear resistance of centrifugally-cast, chrome/nickel and sulphurized cast-iron cylinder-liners. After the first two hours of running, wear on the chrome/nickel liner was too slight to be measured, and that on the sulphurized liner was 0.0008 in. After 500 hours, however, the chrome/nickel liner showed 0.003 in. and the sulphurized liner about 0.001 in. wear. In another experiment, a four-cylinder engine was fitted with two standard liners and piston rings, and two sulphurized liners and rings. At the end of 40,000 miles running the standard liners showed four times, and the untreated rings sixteen times, as much wear as the sulphurized liners and rings.

* Slightly abridged version taken from the *Bulletin* of the British Cast Iron Research Association.

Car Purchase Scheme for Employees

The car park at the works of Ley's Malleable Castings Company, Limited, Derby, will soon be accommodating a number of shining new cars. This is because the directors determined to celebrate the 80th anniversary of the company's foundation in a way which was "different." Both skilled and unskilled employees of the company will own the cars through a "drive yourself to work" loan scheme. More than 20 workers from every department are already buying cars by means of voluntary deductions from their wages. A number of other workers have announced their intention of taking part in the scheme. It applies to all workers aged 55 and under who have 20 years' continuous service with the company. The deductions from the weekly wages are based so that repayment of loans made by the company is completed in four years.

Eligible employees can apply for an interest-free loan up to a maximum of just over £700, which must then be used to buy any popular British car made by one of the firm's customers. The choice of a car is wide as Ley's make component parts for almost every British popular car firm.

U.K.-E.C.S.C. Talks Postponed

The draft agreement of closer association between the United Kingdom and the European Coal and Steel Community came before the meeting in Luxembourg recently of the Council of Ministers of E.C.S.C. A few days previously the agreement had been submitted to the six member governments and it was hoped that a decision which would have to have been unanimous would have been taken on October 27 and 28. The Council of Ministers decided, however, that there had been insufficient time for the governments concerned to consider it and no discussion took place. It was decided that the Co-ordinating Committee, which prepared agendas for the Council of Ministers, should meet on November 12 and that the council should consider the whole agreement on November 22. By that time it is hoped that all the six governments will have finished their examination of the proposed agreement and the Council of Ministers will agree unanimously on any modification which M. Monnet would be empowered to negotiate when he comes to London to sign the agreement.

Production of Castings for Woodworking Machinery*

By R. Higgins.

(*Continued from page* 586)

Bandsaw Castings

Fig. 11 shows a bandsaw machine which is in great demand, being of a convenient size for high-speed band-sawing in joiners' and cabinet makers' workshops, as well as in patternshops. The pillar and base are combined in one casting, and the top and bottom pulleys are completely enclosed except for the portion of saw blade required for sawing. The top and bottom saw pulleys are 30-in. dia., the moulds are produced from "plated" patterns and cast in L.33 aluminium alloy. They revolve at a speed of 750 r.p.m. The top and bottom sets of hinged doors are made in aluminium on the large rollover machine, also the table, which must machine up free from any dirt or porosity.

Fig. 12 shows a mould and the "plated" bandsaw pillar pattern, which is rammed up by Sandslinger in a moulding box 9 ft. by 5 ft. by 3 ft. 6 in. The time allowed for moulding, finishing, coring up and closing is 14½ hours. The average thickness of this casting is ½ in. and the fettled casting weighs 10 cwt. The casting temperature must be at least 1,320 deg. C., and all gases emitted from the cores must have clear, open vents for escape, otherwise the slightest amount of gas trapped in this mould finds its way into the thin flange around the top of the casting, causing it to be shell-like and hollow. Fig. 13 shows the finished casting after rough dressing, and from it the section thickness of the finished casting can be appreciated.

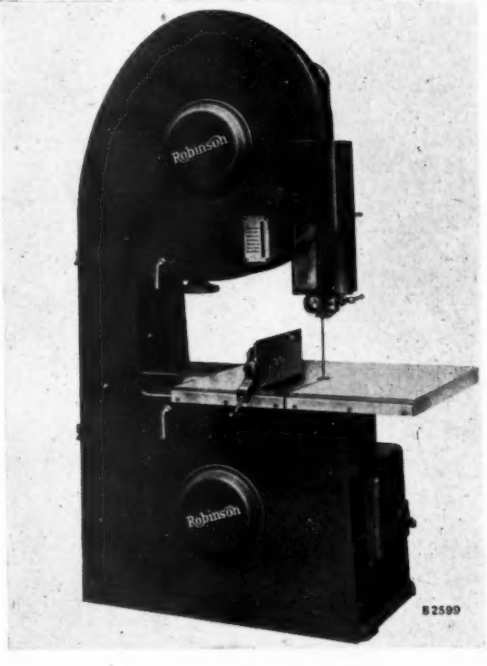
Re-saw Machine

Fig. 14 shows a band re-saw machine (which is a straight-cutting re-saw), and illustrates the hundreds of different castings, machined and otherwise, which are required in its assembly. The tables and guards are machine moulded, and almost all the patterns on this machine are "plated" to suit different sizes of moulding boxes. Bench castings, however, are still floor moulded, in specially constructed boxes; they are of thin section and the method of producing these castings is shown in Figs. 15 to 18.

For these, the moulding box is split across corners, two adjacent sides being lifted away whilst the pattern is being bedded into position. The loose section of box is then replaced and bolted to the fixed section, and bottom part. The mould is hand rammed, a joint being formed at the two opposite corners and along the bottom of the loose section. The top-part is set in position by means of pins and rammed up with runner and riser pegs in the correct locations. The top-part is lifted off, the pattern withdrawn and the loose portion unbolted, lifted away and placed on convenient stands.

The finishing of the moulds, including the top-part, and setting of the body core in the mould in this manner can be accomplished without fear of damage to the green-sand mould, bearing in mind that the mould is 7 ft. 6 in. long, 2 ft. wide and 2 ft. 6 in. deep, with a ⅛ in. metal wall-thickness when coring up. Fig. 15 shows the mould and the loose section after finishing, and all made ready for the main core; Fig. 16 shows the main core in position and the mould ready for closing—note the vent holes in the moulding-box sides for easy escape of mould gases, an essential feature for casting these moulds, where section thickness does not allow the metal time to recover from the passage of gas bubbles. Thickness pieces are used for setting the main core in position, as the least

FIG. 11.—*Popular model of bandsawing machine, for which pillar-and-base and pulley castings are produced at the Author's foundry.*



* Paper read before the Burnley section of the Lancashire branch of the Institute of British Foundrymen.

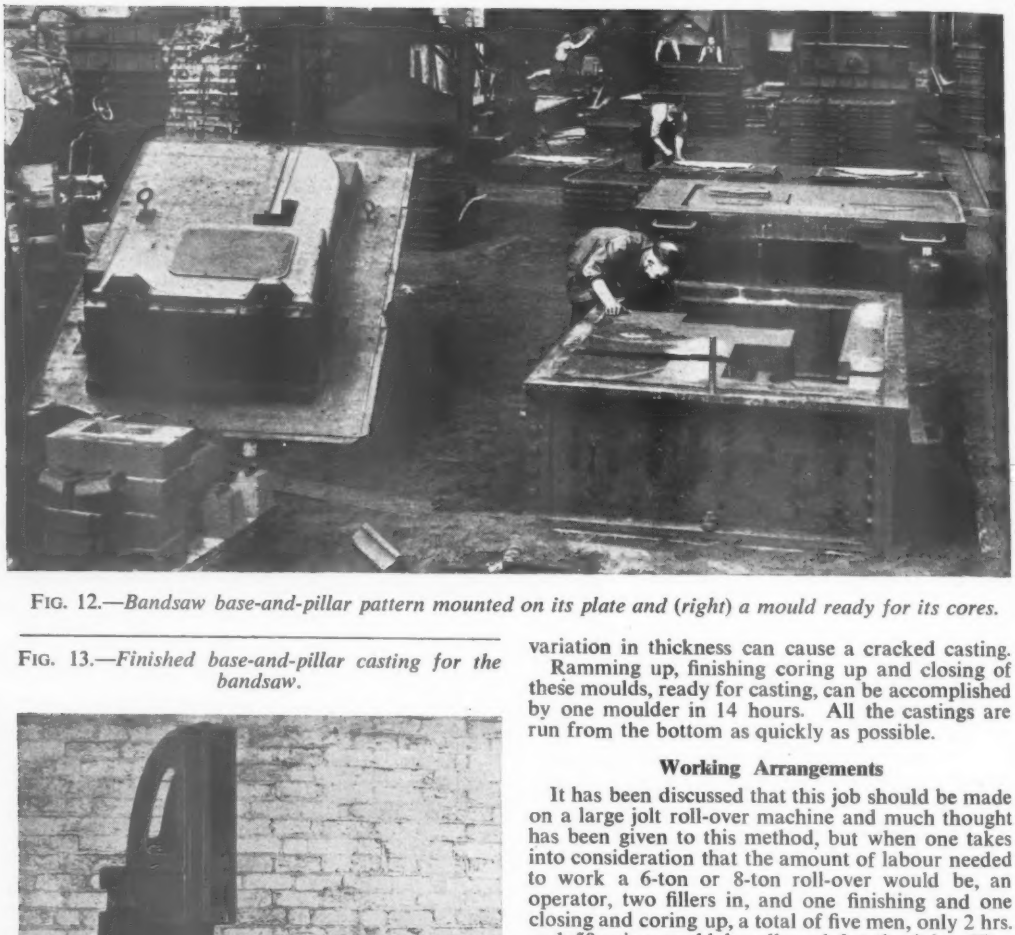
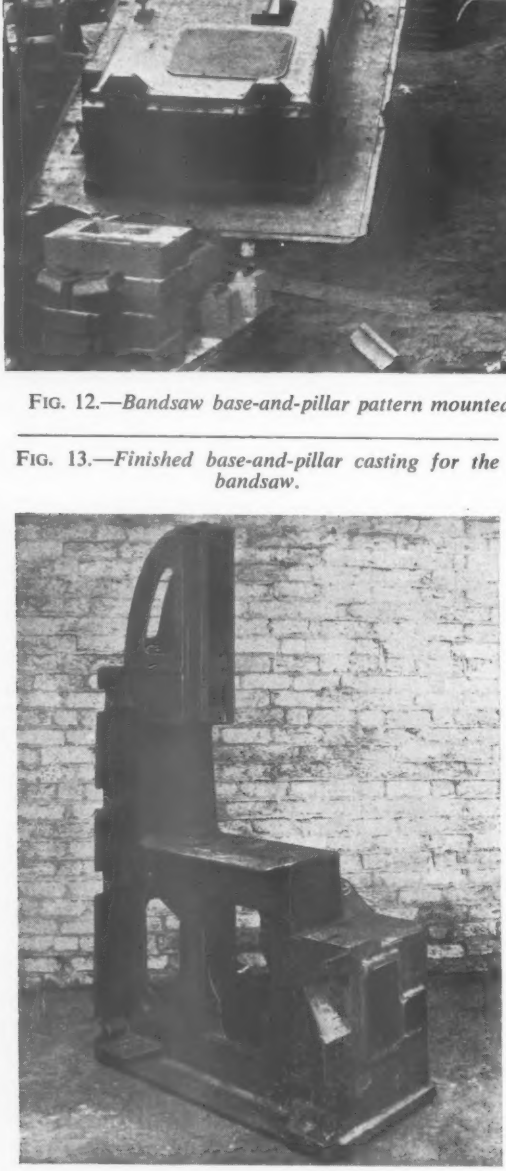


FIG. 12.—*Bandsaw base-and-pillar pattern mounted on its plate and (right) a mould ready for its cores.*

FIG. 13.—*Finished base-and-pillar casting for the bandsaw.*



variation in thickness can cause a cracked casting.

Ramming up, finishing coring up and closing of these moulds, ready for casting, can be accomplished by one moulder in 14 hours. All the castings are run from the bottom as quickly as possible.

Working Arrangements

It has been discussed that this job should be made on a large jolt roll-over machine and much thought has been given to this method, but when one takes into consideration that the amount of labour needed to work a 6-ton or 8-ton roll-over would be, an operator, two fillers in, and one finishing and one closing and coring up, a total of five men, only 2 hrs. and 50 mins. could be allowed for the job. Figs. 17 and 18 show another type of re-saw bench made with a green-sand core, and green-sand mould, the method employed being similar as in the previous case, 10 hours being allowed for this particular job. Figs. 19 and 20 shows the fettled re-saw bench castings of the types described.

All the moulders are on individual piece-work, and prices are set for all jobs. Highly-skilled moulding is required for the production of this type of casting; many people argue against this, but a personal opinion is that skilled moulders are still, and always will be in demand, therefore one cannot remain indifferent to the continuing need for apprentice moulders. All apprentices at this foundry are put to work with a skilled moulder until 18 years of age, after which they work on their own; this method has already shown good results.

The oil-sand cores are made with a 10 per cent. addition of red-sand to the silica sand, bonded with a very cheap core-oil. They break down very easily

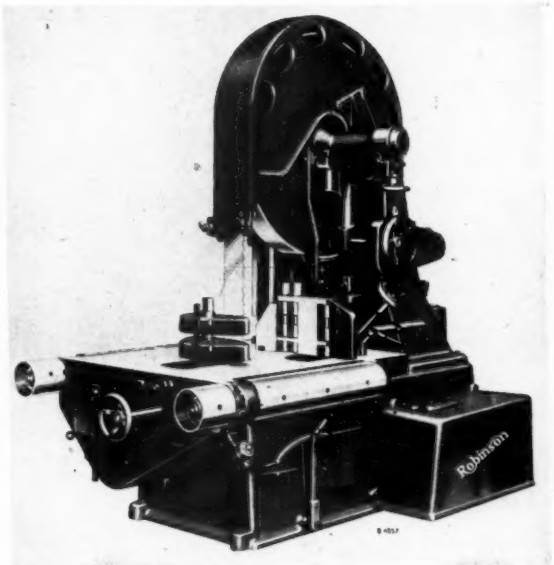


FIG. 14.—*Straight-cutting band re-saw machine made by the Author's firm.*

after contact with the hot metal; this, and the fact that the core irons must have a plentiful allowance of sand in order to allow for contraction (any hindrance to which would immediately cause a cracked casting), is very important. Cores are amply filled with coke and ashes. The metal used for benches is the same as previously mentioned for the table castings.

Large Pulley Castings

Figs. 21 and 22 show two stages in the moulding of the 54-in. dia. top and bottom pulleys which are required for the large band re-saw machines, the bottom pulley being the drive pulley. These castings are machined all over and the periphery is ground. A close-grained iron is required, and owing to the speed at which the pulleys revolve (580 r.p.m.), they are cast in a high-duty alloy iron containing 1.5 per cent. nickel, 0.25 per cent. chromium and 0.2 per cent. molybdenum, the silicon being 1.6 per cent. and phosphorus 0.2 per cent. The moulds are rammed up in pitch-bonded sand and dried. Approximately 1½-in. depth of pitch sand is first rammed on the pattern face and the rest of the mould filled by Sandslinger. The pitch sand used is a mixture of 4 per cent. pelleted pitch, 25 per cent. red sand and 70 per cent. returned sand.

As is shown in the illustrations, the method used for running is for the metal to enter the mould from the bottom of the rim. Several other methods have been tried and each has shown advantages and disadvantages, and on the smaller pulley (48-in. dia.) which is otherwise an exact replica, pencil runners —eight in all—are employed in running the casting. The metal drops directly into the rim; stoppers are used to keep any slag or dirt from entering the mould, these being removed when the bush is full. These castings are left in the mould for at least 12 hr. before the top-part is lifted. Owing to the thick rim and boss causing internal stresses, these castings are apt to crack across the plate if taken out of mould too soon. There have been instances when these pulleys have cracked after two or three years in service.

The pulleys are balanced before being fitted to any finished machines, and are adjusted until perfect balance is obtained. The pitch sand used has a moisture content of 8 per cent. and this has been found to be essential in order that the pitch can be thoroughly distributed over the sand grains. Many foundries are introducing pitch into their green-sand instead of coal-dust, owing to its higher carbon

FIG. 15.—*Finished mould and loose section for a bench casting.*

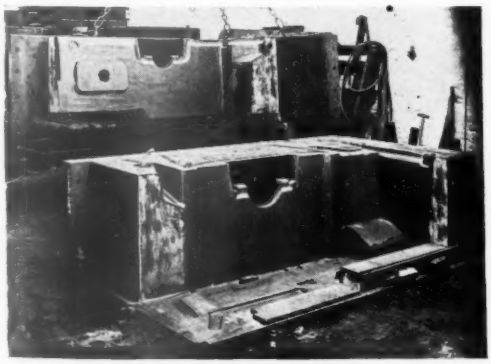


FIG. 16.—*Main core positioned in the bench mould, ready for closing.*

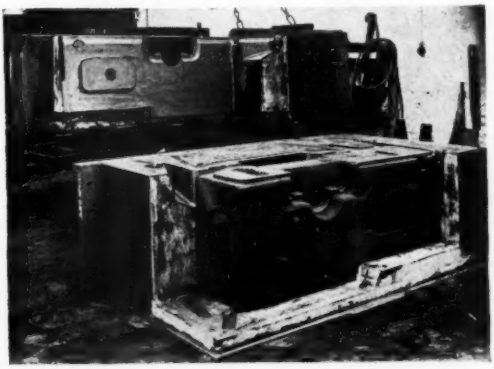


FIG. 17.—*Mould and loose section for another bench casting—this one with a green-sand core and mould.*

FIG. 18.—*Green-sand core positioned in the mould shown in Fig.* 17.

content, and are finding it satisfactory, but the author has been satisfied to use it for dry-sand moulding only.

Frame-side and Smaller Castings

Fig. 23 shows a frame-side casting, used on a planer and moulder machine and Fig. 24 a selection of small parts, the principal casting being the anvil in the background. The size of this particular anvil is 10 in. by 6 in. face and 9½ in. deep and it is solid except for a small ⅜ in. hole through the centre for lifting purposes. Some founders will be thinking what an ideal casting job this is, but it must be borne in mind that the top face has only $\frac{1}{16}$-in. grinding allowance ; no marks or pinholes must show after grinding, and a minimum hardness of 550 Brinell must be obtained. The face is chill cast, and a white iron is used alloyed with nickel and chromium to obtain the high hardness figures and exceptional resistance to abrasion. These anvils are used for the re-truing of buckled circular saws, and must not show the slightest indentation under hammer blows.

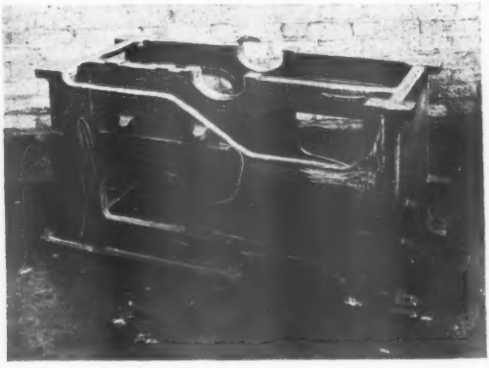
The method of producing the smaller castings for woodworking machines is not different from normal practice, except that if it is at all possible, patterns are all " plated," and in order to reduce labour and costs, stack moulding with box parts is quite common with flat-top moulds.

Ancillary Details

The foundry is well equipped with drop bottom cupolas, having three of 6 tons per hr. capacity and one small 30-cwt. per hr., which is used for the production of the high-duty and alloyed irons. The latter are constantly required for the production of special parts for various machines. As can be ascertained from this account, great reliance is laid on the correctness of composition of metal and mould materials. This, however, cannot be obtained without close co-operation between the technical staff and production management. To help the technical staff in this exacting duty there is at their disposal a very-well-equipped metallurgical laboratory. This is equipped for chemical analysis of

FIG. 19.—*Fettled bench casting produced from the mould shown in Figs.* 15 *and* 16.

FIG. 20.—*Bench casting of the design produced from moulds illustrated in Figs.* 17 *and* 18.



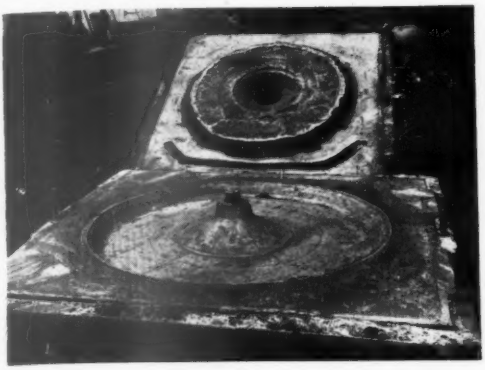


FIG. 21.—*Top part (rear) and bottom part (containing the pattern) of a mould for the 54-in. dia. pulley.*

FIG. 22.—*Pulley mould halves, with the pattern stripped and shown separately (left).*

FIG. 23.—*Frame-side casting used on a planer-and-moulder woodworking machine.*

FIG. 24.—*Selection of smaller castings produced at the Author's foundry.*

ferrous and non-ferrous materials, physical testing, *i.e.*, tensile, compression, hardness and impact; and sand testing. Lastly, but by far not the least important, the laboratory is laid out for the microscopic examination of metals and materials by means of a Vickers projection microscope.

The Author wishes to extend his thanks to the directors of Thos. Robinson & Sons, Limited, for permission to publish and the help which has been given for producing this paper.

Triumphs Abroad

The popularity of British-made motor-cycles for overseas police duties is underlined by two recent orders secured by the Triumph Engineering Company, Limited, of Coventry. A batch of 150 "Tiger 110" models, specially finished in black, is being exported for use by the Buenos Aires Provincial Police, augmenting an existing fleet of Triumphs in use by this force. A further 54 of the same model, ordered by Swedish State Police are of technical interest, for, in addition to the normal magneto and dynamo units, they are equipped with a.c. alternators, the combined output of alternator and dynamo being 120 w. This will cover the additional load of "two-way" radio equipment and special police spot-lamps, etc.

Sealed-van Delivery

The works of Taylor, Taylor & Hobson, Limited, at Leicester, were visited on November 2 by Dr. W. Seldis, deputy commercial counsellor to the Federal German Republic Diplomatic Mission, to inspect the new method of delivering the firm's surface-roundness measuring machine. The German representatives saw a machine sealed-off in one of the firm's vans by Customs officers for delivery direct to the biggest ball-bearing factory in Germany, at Schweinfurt, near Nuremberg. By this means, the machine is taken direct from Leicester to the buyer and arrives almost ready for use instead of stripped of its components. The sealed-van despatch method also saves charges and time at the delivery end. It is to be extended by the firm to customers in other parts of Europe.

Henry Wiggin's Anniversary

An anniversary was celebrated by a luncheon in Glasgow recently of the Zenith Works, Thornliebank, Glasgow, of Henry Wiggin & Company, Limited, which were established on February 18, 1929, and the company have produced an illustrated record of the progress achieved since then. The nickel/copper alloy, Monel, for the development of which the Zenith works was built, was introduced to the U.K. over 30 years ago by Viscount Weir, chairman of G. & J. Weir, Limited, who were then concessionaires for the sale of Monel in this and other European countries for the International Nickel Company.

The works had its actual beginning in a department of the Glasgow works of G. & J. Weir, but by 1928, after many difficulties, in what was then an entirely new field of manufacture, the demand for Monel was such that the formation of a new company, Monel Weir, Limited, was decided upon. A merger between "Inco" and the Mond Nickel Company resulted in the absorption in 1932 of Monel Weir by Mond Nickel's subsidiary, Henry Wiggin & Company. During the war the advent of the Nimonic alloys—developed by Mond Nickel and manufactured by Henry Wiggin—pointed the course of development at Thornliebank, and at present an extensive range of products is turned out, including turbine blades for jet engines, both as pressings and as aerofoil section, and forged rotors up to 18-in. dia. for gas turbines.

Catalogue Exhibition

Our representative recently inspected an exhibition of 100 good catalogues selected from over a thousand. It was held at 10, Hill Street, London, W.1, and later was to be transferred in turn to a number of the large provincial cities. Whilst but little publicity for castings, as such, was shown, the products of foundry concerns were represented by publicity from Aga Heat, Limited, Allied Ironfounders, Limited, De Havilland Propellers, Limited, Ford Motor Company, Limited, and High Duty Alloys, Limited. In general it was the larger concerns which had their trade literature selected, but there were examples from smaller concerns. The one which made an appeal to the writer was from a Keighley wire merchant, which by means of maps showed the provinces producing his wares. The choice for inclusion in the exhibition was mainly governed by the suitability of the catalogue for the public to be reached—whether it be the housewife or the buyer associated with a large engineering concern. It was pleasing to note that the principles enunciated editorially by this JOURNAL were invariably adhered to. There were no glamour girls, no individuals gazing away from the printed page, and no untidiness showing in industrial pictures. The exhibition was organized by the British Federation of Master Printers and the Council of Industrial Design and was opened by Mr. Henry Strauss, Q.C., M.P., Parliamentary Secretary to the Board of Trade.

Change of Name

Robson Refractories, Limited, engineers and consultants, 21, Skinnergate, Darlington, announce the re-acquisition of this name in place of Bentley-Layfield, Limited, and correspondence to the firm should be so addressed.

Uncompensated Industrial Disease Cases

Two schemes made by the Minister of Pensions and National Insurance, Mr. Osbert Peake, under the Industrial Diseases (Benefit) Acts 1951 and 1954 came into operation on November 8. They are the Pneumoconiosis and Byssinosis Benefit Amendment Scheme and the Industrial Diseases (Miscellaneous) Benefit Scheme. The drafts of these schemes were approved by Parliament on October 28.

The Pneumoconiosis and Byssinosis Benefit Amendment Scheme extends the Pneumoconiosis and Byssinosis Benefit Scheme 1952 to cover persons partially disabled by pneumoconiosis or byssinosis who have never received workmen's compensation or industrial injuries benefit for their disease. The scheme already covers uncompensated cases of total disablement or death from these diseases; since its introduction about 3,800 awards of disablement allowance and more than 1,100 awards of death benefit have been made. The benefit for partial disablement is 20s. a week; it is thought that as many as 15,000 persons may qualify.

The Industrial Diseases (Miscellaneous) Benefit Scheme provides for similar uncompensated cases of disablement or death from certain types of skin-cancer of industrial origin (including "mule-spinner's cancer") or from disease due to excessive exposure to X-rays or radio-active substances. The scheme provides an allowance of 40s. a week (with increases in some cases) for persons who are totally disabled by an attack of one of these diseases and who have never received workmen's compensation or industrial injuries benefit for it. The partially disabled can qualify for an allowance of 20s. a week. The scheme also provides a death benefit of up to £300 for relatives who were dependent on the earnings of someone who has died from one of these diseases in cases where no workmen's compensation or industrial injuries benefit has been paid. Deaths which have taken place on or after January 1, 1950, are covered.

Administrations and Claims

The schemes will be administered by the Pneumoconiosis and Byssinosis Benefit Board at Thames House South, Millbank, London, S.W.1. The chairman of the Board is Mr. Paul Sandlands, O.B.E., Q.C., and the deputy chairman, Mr. E. J. Keith, Q.C. Anyone who thinks he may be entitled under the schemes should apply to the nearest local Pensions and National Insurance Office for a copy of leaflet P.N.2, which explains the schemes and contains an application form.

Latest Foundry Statistics

The *Bulletin* of the Council of Ironfoundry Associations states that the output of iron castings during the second quarter of 1954 was at 925,762 tons, some 2½ per cent. higher than in the corresponding quarter of 1953.

The British Bureau of Non-Ferrous Metal Statistics states that the output of copper-base castings during April was 5,031 tons. The first four months of this year showed a production of 21,187 tons as against 16,059 tons in 1953.

The output of aluminium-alloy castings, according to the Ministry of Supply, was 1,399 tons during August as sand cast, 3,109 tons as gravity-die, and 1,106 tons as pressure-die. The production of magnesium castings was 316 tons.

Solubility of Hydrogen in Iron/Carbon Alloys*

Discussion of the Paper by Dr. B. G. Davies and Mr. T. Evans

When this Paper was discussed, the chairman first made clear the sponsorship of the research work reported. Next, the need for caution in interpreting graphs was stressed, followed by a statement as to possible practical implications of the changes in gas content which occurred in the iron during the change from liquid to solid. These changes were put forward by one speaker as a possible explanation of microporosity of high-grade cast iron. The whole work was described as but one piece in a jigsaw of information on gas behaviour and solubility which was being painstakingly assembled.

Sponsorship

THE CHAIRMAN (A. B. Everest), before inviting the authors to present the Paper (at the annual conference of the Institute of British Foundrymen in Glasgow), said it would be noted from the text that the work described was part of a much bigger research that was being carried out under the auspices of the British Cast Iron Research Association and the Institute. The work was part of a wider programme which was regarded as fundamental. The joint sub-committee in charge of the investigation, was representative of the Technical Council of the Institute, together with the Research Association, and it regarded the whole question of gases in cast iron as of the greatest importance in influencing the properties and quality of the products of iron foundries.

The Institute of British Foundrymen contributed annually to that research from funds made available to it by the Joint Iron Council out of the pig-iron levy on the foundry industry; and part of the cost of the research in that case was also borne by Guest, Keen and Baldwins. The Paper by Dr. Davies and Mr. Evans gave some of the results of the work that was carried out with the aid of money provided in that way. It was important that that should be made clear because at first sight the work appeared to be very academic but the Institute attached the greatest importance to it and submitted that in these results members were seeing a real return for the money raised.

MR. T. EVANS expressed thanks to the Institute for the financial help which had enabled a research student to be appointed to deal with the work, and to the Research Association, which had been very helpful in providing specimens of high purity and had been ready with assistance at all times.

Need for Caution in Interpretation

MR. H. MORROGH said that in contributing to the discussion he was in an unfair position since as chairman of the sub-committee to which the investigators had reported the results he had had ample opportunity to study the work as it progressed.

This Paper was a preliminary report on one facet of a general programme of work being carried out on the influence of the gaseous elements in cast irons. At Cardiff, an investigation was in hand to study the solubility of hydrogen in cast irons of various compositions and the study of the iron/carbon alloys was the first step. In other laboratories, investigators were studying the hydrogen content of industrial cast irons. It was hoped that the two sets of results could be put together to evaluate their significance.

Mr. Evans had referred to the need for caution in studying the results and Mr. Morrogh wondered whether, in fact, the investigators had not gone quite far enough in that direction. He had in mind particularly the apparent inflection in the curves presented in Fig. 22. The scatter of the points was quite considerable. It might have been possible to draw nearly horizontal lines through most of the points above 1 per cent. of carbon. It was, however, noticeable that the inflection was obtained in respect of those steels which had a high manganese-content and which were presumably wrought steels. Instead of claiming that the inflection was a specific effect of carbon, it might be fairer to say that the wrought steels were responsible for the inflection.

MR. EVANS said Mr. Morrogh's criticism was fair. Perhaps it would have been better if they had carried out investigations on samples of the same purity as the B.C.I.R.A. samples over the range 0 to 1 per cent. carbon. The results from B.I.S.R.A. steels represented, to some extent, means of getting practice in the technique. Dr. Davies and himself had had a number of discussions as to the real significance of the apparent drop to somewhere around 0.5 per cent. carbon. It would be appropriate if Dr. Davies could say something about it.

DR. DAVIES, whilst agreeing that the apparent minimum value did depend on simply one steel, reminded members that the solubility of the steel had been determined with carbon, manganese, sulphur, etc., present; then the carbon had been removed and the solubility re-determined. There was definitely a drop in the soluble hydrogen in that alloy, as determined, using the same methods and the same material except that the carbon was removed. He believed the work showed that there was some lower solubility around that point than with the higher carbon content.

Practical Implications

DR. R. V. RILEY, as a member of the gases sub-committee, said he was in much the same position as Mr. Morrogh; he was unable to make a detailed

* Paper printed in the JOURNAL, July 29 1954

Solubility of Hydrogen in Iron/Carbon Alloys —Discussion

contribution to the discussion, since all his comments had been made already in committee. Speaking, however, of the practical side of the work, he said that when fundamental work was carefully carried out and the results were published in an academic paper, there was often a tendency for the practical man to be highly critical, but practical men who took this view did not get very far.

Dr. Riley pointed out that in Fig. 22 there was a complete picture of true hydrogen solubility in iron and iron/carbon alloys at various temperatures. By the analytical approach in the laboratory one could obtain figures for the hydrogen content of solid specimens at room temperatures. The general level of gas content in a solid cast-iron specimen, as thus determined, seldom exceeded 3 or 3 ml. of hydrogen per 100 gm. Yet, in Fig. 22, at 1,000 deg. C., an iron/carbon alloy would contain under equilibrium condition, something like 6 ml. per 100 grams. At the melting point, the gas in solution was much higher than this. That meant that on solidification and cooling much of the gas had escaped and this he considered was the all-important aspect of the work. The foundryman must see to it that that hydrogen could get away, for otherwise he would be in trouble with blowholes or weakness due to locked-up hydrogen in the crevices and various other microporosities about which one heard so much nowadays. This was the practical interpretation of the Paper under discussion.

MR. H. G. HALL, also a member of the joint gases sub-committee, said when he had joined the committee, ten years ago, as a simple foundryman, he had started with very high hopes that they would discover how all the various gases affected the properties of cast iron. The first difficulty was to obtain analytical results in respect of gas content, on the same sample and as between one laboratory and another, which bore some measure of agreement. It soon became obvious that from the practical angle it would take a very long time to arrive at the answers foundrymen so earnestly desired; the work could proceed only by small steps. The research described in the Paper was such a step, and a very important one. However, the steps formed parts of a jig-saw puzzle which would take a long time to complete.

Hydrogen presented a particularly difficult problem for the sub-committee and perhaps the major significance of the Author's work, was the reporting of rather low values for the amount of hydrogen in solution in cast iron at various temperatures. These values represented hydrogen in equilibrium and were in general much lower than hydrogen values reported for various commercial cast irons at room temperature. The solubility of hydrogen increased with rising temperature and from the practical angle it was perhaps the possible effect of the escape of hydrogen during transition from the liquid to the solid state which he believed might have a profound effect.

He had seen the work of the Authors in progress at Cardiff and members of the sub-committee were very grateful for the very energetic way in which it was being pursued.

If more of the university and technical colleges could undertake work of a similar nature it would be of immense help in bridging the gap between research and industry, and also in encouraging first-class technicians and scientists to join the foundry industry.

Cause of Microporosity

MR. J. E. O. LITTLE said that now and then it was reported that in the higher grades of Meehanite some microporosity began to occur. Nobody had been able to explain it so far, but it seemed to him that the curves in Fig. 22 of the Paper might help. He asked if he were right in suggesting that hydrogen was to blame.

MR. EVANS said he was not quite sure, because 6 parts per million was 6 ml. per 100 grams, and a 100-gram specimen would occupy 12 ml. So that a very small amount of hydrogen might bring about quite a number of very small holes.

MR. LITTLE added that in specimens having higher carbon content the trouble did not occur, but in the high-grade irons, where the carbon content was 2.8 or 2.9 per cent., it appeared. There was no difference in the hydrogen content.

THE CHAIRMAN, in thanking the Authors, said the reception given to the paper underlined even further the importance to be attached to the work. As Mr. Hall had said, the investigation was a long job; but the work must go on, and one felt certain that, as the pieces of the jig-saw were put together, founders should ultimately gain real fundamental information on that very important question.

(The vote of thanks was warmly accorded.)

Melter's Claim Fails

An action for damages and compensation after an accident at the Appleby-Frodingham Steel Works, Limited, failed at Scunthorpe County Court last month. Thomas Fraser Mitchell, 52-year-old first-hand melter, made the claim against the firm in respect of an accident in October, 1953. He was using a steel rod to clean burner pipes attached to a steel furnace when he fell nine feet through a space between the platform and the furnace. Mr. H. Cassell, who appeared for Mitchell, said the company had been negligent in failing to provide a guard rail with a steel plate which would have filled the gap. A more suitable cleaning rod should have been provided and instruction given not to clean the pipes while the furnace was tilted.

Mr. M. V. Argyle, for the company, who had offered £140 loss of wages provided they were found liable, submitted the workman had been careless and negligent. Mitchell had admitted in court he knew it was dangerous to step off the platform with one foot, and he should have informed the shop manager that he was unable to reach the pipes properly and not have carried out something he knew was dangerous on his own.

Judge Ralph Shove said an employee must take reasonable care of himself and Mitchell should have done so on this occasion. The claim was dismissed with costs.

Public Works and Municipal Services Exhibition

A surprise, uncatalogued exhibit at the Public Works and Municipal Services Exhibition opened by Mr. Nigel Birch, Minister of Works, at Olympia, London, on Monday, November 15, was a mains power, gas-turbine generating set. Made by Petbo, Limited, it incorporates the 60-h.p., continuous-rating engine used in the recent Rover car tests. The engine weighs only 120 lb. and the generator output is 50 k.v.a. at 440 v., three-phase. The fully equipped mobile generating station weighs 1,000 lb., or one-sixth the weight of an equivalent diesel-driven equipment. The following survey includes items which are of major interest to foundrymen and engineers, either because they are foundry products or incorporate many castings.

The hydraulic excavator of J. C. Bamford, Limited, can travel from site to site under its own power. The uses of Lorain cranes and excavators are shown by models and films on the stand of Thos. Storey (Engineers), Limited. A lorry-mounted, diesel-powered, shovel/crane capable of travelling up to 28 m.p.h., is shown by J. Allen & Sons, Limited. A new design of excavator grab for heavy duty belongs to Priestman Bros., Limited, who introduce their new "Tiger" V crawler-mounted diesel excavator of ⅜-yd. bucket capacity. The Smith "21" universal type excavator has a newly designed goose-neck boom. The latest model of Newton, Chambers & Company, Limited, is the NCK 205 crane/excavator, while Blaw Knox, Limited, show the new "BK-50" excavator. Ransomes & Rapier, Limited, show a full range of machines in the form of small-scale models. Shown for the first time is the "Weatherall" hydraulic loading shovel comparable to, but at a considerably lower price than, its American equivalents. Ruston-Bucyrus, Limited, feature many of their well-known models.

The "Matbro Super Loadstar" of Mathews Bros., Limited, is claimed to be the first giant bulk loader with front-wheel drive to be manufactured in Britain. E. Boydell & Company, Limited, have a number of loaders, which incorporate the Muir-Hill patent suspension, giving an exceptionally high safety margin over rough ground.

The new Drayton dumper has an 8-h.p. diesel engine of new and simple design with completely new transmission, while the 3.7-yd. "Hi-Speed" dumper of Chaseside Engineering Company, Limited, is fast with good braking. The "SF" dumper of Aveling-Barford, Limited, is entirely new as is also their maintenance grader. Barber-Greene Olding & Company, Limited, show the largest open-bowl scraper manufactured in Britain.

The Patent Lightning Crusher Company, Limited, have two new crushers, and Nordberg show crushing and screening machinery for the treatment of ores and minerals. All are of British manufacture. Pegson, Limited, feature a new 30-in. by 42-in. single-toggle roller-bearing crusher with a fabricated steel body. Robert Broadbent & Son, Limited, have a portable stonebreaking plant and Armstrong Whitworth show the Kue Ken jaw crusher.

The range of rock drills includes the household names of Climax, Consolidated, Ingersoll-Rand, Padby, Warsop Power Tools and Atlas Diesel. The compressors manufactured by some of these firms, together with those of Broom & Wade, Air Pumps, Bristol Pneumatic and Arpic, are shown on their respective stands. They all have new developments and some new machines. Of particular interest is the Pescara-Muntz free-piston portable air-compressor which is entirely British developed and made.

George Pike, Limited, show, for the first time, "jet" conveyors, which throw sand, shale, earth, peat, coal and so forth, distances of 6 to 20 yds. at the rate of 35 to 60 bulk tons per hour. H. A. Saunders, Limited, have a new industrial tractor, while Blackwood Hodge, Fowler, Olding, David Brown and Rotary Hoes show their standard models, each with a minor or major improvement or modification.

Mechanical barrows, which will move as much as three men can push and capable of use in limited spaces, have been developed by Benford, Limited. The new 3½-1½-g.p. Lister diesel for pumping plants, saw benches, etc., is also featured. The Brush Group have a useful range of diesel-generators, while individual members of the Group—McLaren's, Petters, Hopkinson Electric and the National Gas & Oil Engine, supply diesel and petrol engines from 1½ to 96 h.p. The famous names of Ruston and Bryce Berger are well in evidence.

Though the Horstmann Gear Company, Limited, shows electric time-switches for street lighting, they are also keenly interested in production control.

There is a wide range of pumps of all sizes and for all purposes, which may be seen on the stands of Pegson, Ransomes & Rapier, Sykes, Ingersoll-Rand, Goodenough, Hughes & Lancaster, Witlor, Johnson, Midland Tunnelling, Beresford and Keelavite. An oil- and acid-resisting sealer and paint are shown by Sealocrete, while Secomastic, Limited, shows a number of protective coatings for iron and steel, including "Galvafroid."

A new product by Philplug Products, Limited, is the Philbolt Anchor bolt for all types of heavy fixtures. It has the advantage of absorbing vibration.

There are many other makers of equipment of interest to foundry and metallurgical industries. The products include shovels and hand tools, brake and clutch linings, wire ropes, filters, valves, railway materials, electric and impact hammers, protective clothing, pipeline protection, water-treatment apparatus, power tools, hoists and air tools. There are many new types, and developments added to the older ones.

The exhibition closes on November 20. Particulars of a few other stands of interest to founders are appended:—

STEWARTS AND LLOYDS, LIMITED, claimed to be the largest manufacturers of steel tubes in Europe, are exhibiting in the National Hall on stand No. 119. A special feature of this year's display is a large model of a street scene designed to portray the practical application of S & L's tubes as used by public utilities

Public Works and Municipal Services Exhibition

for a variety of purposes. The roadway is in section and shows—in actual size—steel, water, gas and sewage mains, with a selection of joints and appropriate protections. Flanking each side of the model are photographs illustrating domestic, municipal and industrial uses of gas and water. The pictures are linked to the respective mains by examples of service pipes and fittings. In addition, a number of tools which are of particular interest to water engineers are exhibited.

THE DISPLAY on stand 101 of Victaulic Company, Limited, includes joints for steel, cast- or spun-iron pipes with prepared ends. These are designed in suitable ranges for vacuum or pressures up to one ton per sq. in. A range of malleable fittings for use with the joints will also be on show, together with hose couplings. A prominent feature is the display of Viking Johnson couplings on plain-ended pipes, as well as couplings in sizes 2-in. dia. and under.

WHAT IS CLAIMED TO BE the largest stone-breaker of its kind in Britain will be exhibited at Olympia, by Goodwin Barsby & Company, Limited, of Leicester. This machine has an output of 100 tons of broken stone an hour. Also on show will be mobile gravel-crushing and screening equipment weighing over 30 tons.

A FULL RANGE of Rolls-Royce oil engines is on show. Other Derbyshire products include equipment, machinery, and plant from the following firms, the Staveley Iron & Chemical Company, Limited, Chesterfield (cast-iron pipes and castings); Coleman & Sons, Limited, Derby, heaters and sprayers for tar and bitumen.

Charger Driver's Claim Dismissed

Judgment, with costs for the defendants, John Summers & Sons, Limited, Hawarden Bridge Steel Works, was given by Mr. Justice Austin Jones at Chester Assizes recently in a claim brought by an employee whose legs were crushed in a works accident in January, 1952.

The plaintiff, Edgar Maurice Hill, of Shotton, claimed damages for personal injuries. The judge said that Hill was the driver of a charger which was being used to move trucks. After stopping the charger the plaintiff got out to uncouple one of the trucks. He claimed that as he got out of the cab, he slipped on some grease on the platform and fell against one of the controls, causing the machine to move.

The plaintiff claimed that he had brought the charger to a standstill by pressing a red button, the effect of which ought to have been to cut off the current from the control. It appeared, said the judge, that Hill was trapped between the cab and the platform, and the cab came over his legs as he was lying flat. His legs, although not broken, were very badly crushed.

The defendants claimed that Hill failed to operate the red button before stepping off the platform and that he failed to bring the cab up to the platform.

The judge found that the accident did not happen through any fault in any part of the electrical equipment of the charger, and said there was no evidence other than that of the plaintiff himself that there was grease on the platform, although this was possible. It might be that in getting off to uncouple the truck, Hill did not switch off at all, and "just took a risk that people do take." The accident would, therefore, be due to his own negligence.

Shortage of Generating Plant

For the next three years the Government has authorized the commissioning of generating plant with an output capacity of 1,500,000 kilowatts, Lord Citrine, chairman of the British Electricity Authority, told the Birmingham Electric Club at its golden jubilee banquet on November 12. This target was not being attained. The steel shortage, which became particularly acute in 1952, had delayed construction work for a protracted period, and at one time work on some 11 power stations was held up, he went on.

In 1953, 1,413,000 kilowatts had been commissioned, but it was doubtful whether even that figure would be reached in 1954, continued Lord Citrine. Unexpected difficulties had been encountered and a strenuous effort was required to overcome these.

The steel shortage had now been overcome and 1955 should see a considerable improvement in the amount of plant to be put into service. The Government had authorized the installation of 1,750,000 kilowatts of plant in 1958, and this would rise, in subsequent years to nearly 2,000,000 kilowatts. Lord Citrine said he had been assured that the achievement of this target was well within the capacity of the manufacturing industry, and if this programme was realized it would put an end to power cuts.

Steel Industry's Target

A target of 18,500,000 tons of steel this year will almost certainly be overhauled by the industry. The Iron and Steel Board has announced that steel production in October averaged 374,500 tons a week. This equalled the output of May last, which was the previous highest rate achieved. Last month's output compares with 355,000 tons for October, 1953.

Pig-iron production last month averaged 230,700 tons a week, this being an increase of 9,200 tons a week over the corresponding month of last year.

Latest steel and pig-iron output figures compare as follow with earlier returns:—

Period.	Pig-iron.		Steel ingots and castings.	
	Weekly average.	Annual rate.	Weekly average.	Annual rate.
	Tons.	Tons.	Tons.	Tons.
1954—September ..	222,900	11,591,000	372,300	19,358,000
October ..	230,700	11,998,000	374,500	19,472,000
1st 10 months	227,300	11,820,000	354,400	18,428,000
1953—September ..	213,900	11,123,000	346,500	18,019,000
October ..	221,500	11,519,000	355,000	18,460,000
1st 10 months	212,400	11,045,000	336,300	17,489,000

Pig-iron Output at Shotton

Last week, over 9,000 tons of pig-iron were produced from a single blast furnace at the Hawarden Bridge Steel Works, Shotton, of John Summers & Sons, Limited, which is claimed as a European record. The furnace came into production last year and an output of 7,000 tons was promised from it.

LOUGHBOROUGH COLLEGE OF TECHNOLOGY is one of the four colleges chosen to provide ten-week work-study courses sponsored by the Ministry of Education The other three are Leicester College of Technology, Cranfield College of Aeronautics, and Royal Technical College, Glasgow.

Pig-iron and Steel Production

Statistical Summary of September Returns

The following particulars of pig-iron and steel produced in Great Britain are from statistics issued by the British Iron and Steel Federation. Table I summarizes activities during the past six months. Table II gives production of steel ingots and castings in September, and Table III, deliveries of finished steel in August, 1954. Table IV gives the production of pig-iron and ferro-alloys in September, 1954, and furnaces in blast. (All figures weekly averages in thousands of tons.)

TABLE I.—*Iron and Steel Price Index and General Summary of Pig-iron and Steel Production.*

Period.	Price Index, 1938 = 100.			Iron-ore output.	Imptd. ore used.	Coke to blast-furnaces.	Pig-iron, ferro-alloys prod.	Scrap used in steel prod.	Steel (incl. alloy).			
	I. & S.	Coal.	All comdts.						Imports.[1]	Prod. ingots, castings.	Delivrs. finished steel.	Stocks.[2]
1952[3] ..	254	329	323	306	190	228	202	171	29	310	252	683
1953	260	350	323	304	2·7	237	215	188	18	339	262	962
1954—April ..	260	360	325	312	2·6	243	232	200	4	368	272	945
May ..	261	365	326	306	236	240	231	208	4	375	288	927
June[4]	265	365	328	289	239	240	233	204	4	372	274	1,011
July ..	265	365	328	284	213	227	211	142	4	263	217	1,078
August	265	365	325	266	232	237	227	177	5	326	228	1,128
Sept. ..	265	365	324	293	231	232	223	212	7	372	—	1,066

TABLE II.—*Production of Steel Ingots and Castings during September*, 1954.

District.	Open-hearth.		Bessemer.	Electric.	All other.	Total.		Total ingots and castings.
	Acid.	Basic.				Ingots.	Castings.	
Derby, Leics., Notts., Northants and Essex ..	—	3.8	13.0 (basic)	1.8	·0.2	17.8	1.0	18.8
Lancs. (excl. N.W. Coast), Denbigh, Flints and Cheshire	1.8	27.1	—	2.0	0.3	30.0	1.2	31.2
Yorkshire (excl. N.E. Coast and Sheffield) ..								
Lincolnshire	—	39.7	—	—	0.1	39.7	0.1	39.8
North-East Coast	2·0	66.9	—	1.3	0.4	68.7	1.9	70.6
Scotland	3.1	40.3	—	1.3	0.8	43.6	1.9	45.5
Staffs., Shrops., Worcs. and Warwick	—	19.4	—	1.2	0.8	19.5	1.9	21.4
South Wales and Monmouthshire	4.7	73.1	6.4 (basic)	1.2	0.2	84.8	0.8	85.6
Sheffield (incl. small quantity in Manchester) ..	9.6	32.3	—	10.1	0.5	50.5	2.0	52.5
North-West Coast	0.5	0.6	5.2 (acid)	0.5	0.1	6.8	0.1	6.9
Total	21.7	303.2	24.6	19.4	3.4	361.4	10.9	372.3
August, 1954	14.7	272.8	21.5	13.9	2.7	317.5	8.1	325.6
September, 1953[4]	22·9	283·0	17.8	18·9	3·9	335·2	11.3	346.5

TABLE III.—*Production of New Non-alloy and Alloy Finished Steel.*

Product.	1952[5].	1953.	1953.	1954.	
			August.	July.	August.
Non-alloy steel:					
Ingots, blooms, billets and slabs[6]	4.5	4.7	4.0	3.6	3.8
Heavy rails ..	8.0	8.7	6.1	8.2	6.9
Sleepers, etc. ..	1.8	2.2	2.0	1.3	1.0
Plates, 3 mm. thick and over ..	41.4	46.5	34.0	31.4	43.0
Other rolled prod...	39.0	43.9	37.8	34.7	36.2
Wire rods and other rods, bars coiled	15.9	15.6	13.2	12.2	19.8
Light rolled prod...	46.0	49.3	42.6	38.1	38.1
Bright steel bars ..	6.5	6.7	5.0	5.2	4.9
Hot-rolled strip ..	18.8	18.8	14.2	17.5	16.8
Cold-rolled strip ..	6.1	5.2	4.3	6.0	5.3
Sheets, incl. coated	31.7	34.1	27.8	32.6	29.9
Tin, terneplate and blackplate ..	16.0	14.9	11.3	14.9	12.6
Steel tubes, pipes	20.1	20.1	16.5	18.1	15.9
Tube, pipe fitgs.	0.4	0.3	0.3	0.4	0.3
Tyres, wheels, axles	3.5	4.4	3.5	3.7	3.9
Forgings (excl. drop forgings) . ..	2.8	3.1	2.6	2.2	2.1
Steel castings ..	4.2	4.0	3.0	3.0	3.8
Tool and magnet steel	0.3	0.3	0.2	0.2	0.2
Total	267.0	282.8	228.4	233.3	244.5
Alloy steel	13.4	13.7	11.1	10.6	10.7
Total deliveries from U.K. prod.[7] ..	280.4	296.5	239.5	243.9	255.2
Add: Imported finished steel ..	12.9	6.8	5.5	2.3	5.2
	293.3	303.3	245.0	246.2	260.4
Deduct: Intra-industry conversion[8] ..	42.7	42.6	33.9	30.8	33.4
Total net deliveries of new material ..	250·6	260·7	211·1	215.4	227.0

TABLE IV.—*Production of Pig-iron and Ferro-alloys during September*, 1954.

District	Furnaces in blast.	Hematite.	Basic.	Foundry.	Forge.	Ferro-alloys.	Total.
Derby, Leics., Notts., Northants and Essex	24	0.2	19.4	22.9	0.7	—	43.3
Lancs. (excl. N.W. Coast), Denbigh, Flints. and Cheshire ..	6	—	14.6	—	—	0.6	15.2
Yorkshire (incl. Sheffield, excl. N.E. Coast) ..							
Lincolnshire ..	8	—	30.3	—	—	—	30.3
North-East Coast	22	4.2	45.0	—	—	1.4	50.6
Scotland	9	0.9	16.5	1.7	—	—	19.1
Staffs., Shrops., Worcs., and Warwick ..	8	—	8.6	1.4	—	—	10.0
S. Wales and Monmouthshire	9	5.0	31.5	—	—	—	36.5
North-West Coast	7	16.7	—	—	—	1.2	17.9
Total ..	93	27.0	165.9	26.0	0.7	3.2	222.9
August, 1954 ..	98	29.4	169.3	24.1	1.1	3.5	227.4
September, 1953[4]	104	26.6	155.4	26.2	1.1	4.6	213.9

[1] Weekly average of calendar month.
[2] Stocks mainly ingots and semi-finished at the end of the years and months shown.
[3] Average 53 weeks ended January 1953, all tables.
[4] Five weeks, all tables.
[5] Other than for conversion into any other form of finished steel listed
[6] Includes finished steel produced in the U.K. from imported ingots and semi-finished steel.
[7] Material for conversion into other products also listed in this table.
[8]

Personal

SIR FREDERICK SCOPES has been appointed chairman of the Board of Governors of the National Foundry College, Wolverhampton, to succeed the late Mr. P. H. Wilson.

MR. T. J. BAILEY has been elected to the Readership in the Design and Analysis of Scientific Experiment at Oxford University, with effect from January 1 next, for seven years.

MR. ANDREW M. WARD has been appointed secretary of the Scottish Engineering Employers' Association in place of Mr. James Miller, who has retired on account of ill-health.

DR. F. M. HARDIE, education and training officer of the steel division of the Steel Company of Wales, Limited, has been appointed education and welfare manager of the division.

MR. J. DEAN, secretary of A.P.V.-Paramount, Limited, the foundry subsidiary of the A.P.V. Company, Limited, at Crawley, Sussex, has been appointed a director of the company as from November 1.

MR. H. M. MORGAN, works engineer of the Cargo Fleet Iron Company, Limited, Middlesbrough, has been installed as president of the Cleveland Institution of Engineers in succession to MR. F. KENNEDY.

MR. W. D. FENTON, secretary and commercial engineer of the North of Scotland Hydro-Electric Board, is giving up his job at the end of the year to take over as deputy chief executive officer of the Uganda Electricity Board.

MR. GEOFFREY FLATHER, joint managing director of W. T. Flather, Limited, Sheffield, is leaving next month on a business trip to South Africa in connection with the selling of the company's special steels. He hopes to be back in Sheffield in March.

MR. F. C. LIMBREY who has been Deputy Regional Controller for the Ministry of Supply in the Midlands since 1947 left on November 1 to take up a new appointment in London. In the Midlands, he had been concerned with the control of scarce materials, but that job is virtually redundant.

MR. H. MORTON has resigned from his position as general works manager with Follsain Wycliffe Foundries, Limited, of Lutterworth, to become general manager of the foundries and ancillary department of the British Northrop Loom Company, Limited, Blackburn. Mr. Morton joined the Lutterworth company late in 1947.

MR. HEATH STEELE, vice-president of the American Metal Company, has resigned as a director and will retire as vice-president on December 31 on reaching retirement age after 37 years' service. He will become a consultant to the company. MR. HUGO DE NEUFVILLE, vice-president in charge of smelting and refining operations, who has been with the company since 1927, has been elected a director.

MR. T. HARRY SHAW, commercial manager in the hardened-steel-roll department of Thos. Firth and John Brown, Limited, steelmakers, engineers, etc., Atlas Works, Sheffield, has been appointed a local director of the firm. He joined Firth-Brown's in 1928 as an assistant manager of the shell shop, and became interested in hardened steel rolls in 1929. He was appointed commercial manager of the department in September, 1950. Mr. Shaw is a native of Sheffield, and has travelled widely overseas for the firm.

Obituary

THE DEATH TOOK place recently of MR. WILLIAM HUGH KANE, managing director of the foundry and engineering firm of W. H. Kane & Company, Limited, of Ulster, who have foundries and works in Larne and Ballyloran. Mr. Kane, who was 88, went to Larne some fifty years ago from Ballymena to develop the foundry which his father, Mr. William Kane, had established half a century earlier.

MR. JOHN OGDEN HEY, the 91-year-old proprietor of Schofield's Foundry Company, of Durn, Littleborough, near Rochdale, died last week. He began work at Schofield's Foundry as a young man before the first world war. Later, he took over the position of secretary-manager of the firm and in 1919 he assumed control. He took an active interest in the running of the business until a few years ago, when advanced age confined him to his home.

SIR WALTER EVANS, former joint managing director of Joseph Evans & Sons, Limited, pump manufacturers of Heath Town, Wolverhampton, died on November 8, at the age of 82. The firm was founded in 1800 by Sir Walter's great-grandfather, and moved to the Culwell Works, Wolverhampton, in 1881. When it became a private limited company, Mr. Joseph Evans, Sir Walter's father, was chairman. In 1944, a major share in the firm was acquired by a Bristol firm, and Sir Walter continued for a few months as a director, before he finally retired. He was created a baronet in the New Year Honours in 1920 for public and local services.

MR. WILLIAM MARTER BURNE FURNISS, managing director of the Electric Construction Company, died on November 8 at the age of 47. Mr. Furniss succeeded his father as managing director of the firm at the beginning of this year. He was educated at the Wolverhampton Grammar School and Staffordshire Technical College, and joined the firm as an indentured apprentice in 1925 and gained experience on the technical and works side of the organization. He became assistant manager in 1941 and manager in 1943, rising to be assistant managing director. Four years ago, Mr. Furniss and his father launched the firm's profit-sharing scheme, under which a percentage of the profits go to the employees.

MR. GEORGE WILLIAM WORTLEY, of Falkirk, who was general manager of the Gothic Works of R. & A. Main, Limited, since 1922, has died. A Yorkshireman, he studied in Sheffield and London and entered the gas industry just before the first world war. After serving with the Royal Navy he joined R. & A. Main in London and was transferred to the Gothic Works, Falkirk, in 1920. Two years later he was appointed general manager and in 1944 was appointed to the Board of the firm and its associated companies. During his time in Falkirk, Mr. Wortley raised Gothic Works from a small establishment to its present considerable standing. He was responsible for the introduction of wet-process vitreous-enamelling of gas cookers in this country—a notable achievement which was instrumental in bringing about a revolutionary change in domestic gas-cooking appliances. Mr. Wortley also took a keen interest in the improvement of gas-cooking appliances, and especially studied the problems associated with the use of cast iron in their manufacture. His eldest son is general manager of the Edmonton works of the firm.

News in Brief

WOLVERHAMPTON METAL COMPANY, LIMITED announce that Mr. A. M. Anderson has been appointed a joint managing director.

WOOLWICH BOROUGH COUNCIL has decided that a smokeless zone should be set up in the St. Mary's redevelopment area in south-east London.

HUNSLET ENGINE COMPANY, LIMITED, locomotive manufacturers, Leeds, have secured a £250,000 order from British Railways for 16 Diesel-locomotives, weighing 30 tons each, to be used for shunting purposes.

AS A RESULT of the Commercial Motor Show, the Automobile Gear Box Division of David Brown & Sons (Huddersfield), Limited, gear cutters, have secured orders worth £90,000 for commercial gearboxes.

ORIGINATING from the recent Commercial Motor Show, orders worth approximately £90,000 for two types of commercial gearboxes have been received by the automobile gearbox division of David Brown & Sons (Huddersfield), Limited.

LONDON TRANSPORT has invited the Birmingham Railway Carriage & Wagon Company, Limited, and Metropolitan-Cammell Carriage & Wagon Company, Limited, to build the prototypes of new underground trains with an exterior made of lightweight aluminium alloy.

AT TO-DAY'S meeting of the Northern section of the Institute of Vitreous Enamellers at the Queen's Hotel, Piccadilly, Manchester, at 7.30 p.m., Mr. K. A. Maskall will give his paper entitled:—"Towards Thinner Groundcoats" which won for Mr. Maskall the Whittle Medal of the Institute.

MR. PAUL TAYLOR, head of John Taylor & Company, bell founders, of Loughborough, gave a lecture to the Leicester Association of Engineers, at Leicester College of Technology. In his address, illustrated by lantern slides, he described different kinds of bells and their hangings, and the design of bell-frames.

MR. JOSEPH CHAMBERLAIN, director and chief engineer, of Aiton & Company, Limited, pipe engineers, of Stores Road, Derby, left London Airport on November 10 on a business trip to America. It is expected that he will make the return journey on the Queen Mary and should arrive home for Christmas.

SOME SIXTY MEMBERS of the Midland Junior Gas Engineering Association recently visited the factory of Walker Crosweller & Company, Limited, Cheltenham, manufacturers of "Arkon" instruments and "Leonard" thermostatic mixing valves. This visit was one of the many items in the Association's programme for this their Jubilee Year.

EARLY THIS MONTH, a fault in an "incoming" electrical transformer affected 500 workers at Qualcast, Limited, Victory Road, Derby, who had to be sent home. In a number of departments electrically-heated furnaces were affected. The East Midlands Electricity Board soon put repairs in hand, and normal working was later resumed.

BIRMINGHAM ENGINEERING INDUSTRY STAFFS have arranged a meeting on November 17 in support of a campaign for three weeks' holiday a year after 12 months' service. The application was made jointly by staff unions on November 9 to the Engineering and Allied Employers' National Federation who have agreed to submit it to their management board.

IN CONNECTION with next year's International Foundry Congress, there will be a considerable demand for host/interpreters, both ladies and gentlemen. Members of the Institute of British Foundrymen and their ladies who can act in this capacity are asked to write to Mr. G. Lambert, the secretary, at the Institute's head office, St. John Street Chambers, Deansgate, Manchester, 3.

AN ANALYSIS of labour turnover in the Wolverhampton district, covering the period from September 1, 1953, to August 31, 1954, and based on returns submitted by 32 companies, showed that the metal-manufacturing trades (foundries, steel sheet and tubes) recorded the lowest average turnover—25 per cent. The average national overall level of labour turnover is 33 per cent.

THE NEW SECOND STOREY of the central research laboratory of the Permanent Magnet Association at Brown Street, Sheffield, was on view to industrialists and others on November 8. This, added to the first storey, built in 1946, has made possible rearrangement of the laboratory as well as the addition of a library and conference room, offices, and a complete heat-treatment laboratory.

A SERIES OF TALKS on industrial-accident prevention is being held in Sheffield this winter for apprentices and other young workers. Arrangements have been made by the Sheffield Area Industrial Group of the Royal Society for the Prevention of Accidents which has asked member-firms to release three or four young people to attend the next talk on December 8. The group has received 174 entries from young people for an essay competition.

AN EXCESS of applicants to become apprentices at Firth Brown Tools, Limited, Carlisle Street, Sheffield, was mentioned at the company's annual apprentices prize-giving on November 9. Mr. Eric Mensforth, managing director, said that the demand for places far exceeded requirements. In order to ensure that new entrants were of a satisfactory standard, all applicants for entry must now first undergo an ability test at the company's continuation school.

SAMUEL OSBORN & COMPANY, LIMITED, Clyde Steel Works, Sheffield, report an increase of £78,439 in trading profits to £929,826, after £161,920 has been set aside for replacements of fixed assets. After tax deductions the net balance is £408,529, an increase of £101,349. With a final 15 per cent, the year's dividend is unchanged at 25 per cent. £150,000 is reserved for expenditure on research and development projects. Last year there was a credit of £162,120 from stock reserve.

THE 36TH ANNUAL PRIZE-GIVING of the Stanton Ironworks Company, Limited, was held in the club house, Stanton, amongst those present being Sir Frederick Scopes, managing director, the Mayor and Mayoress of Ilkeston (Councillor Ivan and Mrs. Straw). The prizes were presented by Dr. A. E. Morgan, warden of the East London Cultural Centre, Toynbee Hall, who in the course of his remarks mentioned the fact that the firm had spent £20,000 on education in the past year.

KELVIN & HUGHES (INDUSTRIAL), LIMITED, members of the Scientific Instrument Manufacturers' Association are taking part in the "Electronics at Work" exhibition, to be held at the Chamber of Commerce Hall, New Street, Birmingham, November 23 to 25. Among the instruments they will show are their Mk. V supersonic flaw detector; four-channel dynamic strain recording equipment; electronic temperature controllers; and a new Econometer—a device for indicating combustion efficiency.

CONTRACTS for industrial wheeled tractors, worth about £105,000, which have recently been placed by the

News in Brief

Ministry of Supply with David Brown Tractors (Engineering), Limited, of Meltham, near Huddersfield, bring the total value of the Ministry's orders for industrial tractors currently on hand at the Meltham factory to well over £350,000. The latest contracts are on behalf of the Ministry of Civil Aviation for machines, one of which is a new model, to be used on British airfields for general towing duties, as well as salvage operations.

THE WHOLE of the issued share capital of British Oilfield Equipment Company, Limited, which was jointly owned by Heenan & Froude, Limited, and the Brush Group, Limited, has been sold to Cameron Iron Works, Inc., Houston, Texas, U.S.A. The main business of British Oilfield Equipment Company in recent years has been the manufacture and sale under licence of oilfield equipment to the specifications and designs of Cameron Iron Works, Inc. British Oilfield will continue to operate under its present name, and Mr. Edward Benjamin will continue as managing director.

GENERAL ELECTRIC COMPANY, LIMITED, have been entrusted by Dorman Long (Steel), Limited, with a contract for electrical plant and control gear valued at £250,000. The order covers electrical equipment for the auxiliary drives of a combined universal beam-and-heavy-section mill for the new works at Lackenby, and includes nearly 6,000 h.p. of mill-type motors. Ten synchronous motor-generator sets will provide the d.c. supplies for the mill motors. The control gear, which embodies the G.E.C. control exciter system, includes five switchboards of the flatback-contactor type.

TO FACILITATE further expansion of their engineering works at Cathcart, Glasgow, G. & J. Weir, Limited, are to close down their foundries and transfer this work to Thornliebank. The development, made necessary by pressure of work, will not cause any serious upset to the workers, all of whom will be transferred to Thornliebank. The foundries at Thornliebank are operated by the Argus Foundry, Limited, a subsidiary of Weir's, and extension of this plant is also to be undertaken. Construction of the new foundry will take a considerable time, and completion of the transfer from Cathcart will not be for another two years.

ELKINGTON & COMPANY, LIMITED, Walsall, were fined £5 and £1 13s. costs by Walsall magistrates on Novber 10 when they pleaded guilty to failing to insulate an electric lamp, as required by the Factories Act, with the result that an employee of a contracting firm who was carrying out furnace repairs at the firm's metal refining works, received an electric shock. It was stated that while the contractors were engaged in lining the interior of a furnace flue, an electric light was rigged up for them by Elkington's electrician. The type of lamp used was one in which the metal socket was alive and which should have been protected by an insulating skirt. The workman concerned went to move the light and touched an exposed part.

THE PROGRESS of the Western Iron Company, Limited, of Finiskin Road, Sligo, which is now over 20 years in existence, was reviewed by a director, Mr. D. Frame. He presided at a dinner in the Yeats Country Hotel, Sligo, at which the guests were representatives of the several leading foundry executives in Eire Republic and business associates of the Sligo firm. Mr. Frame said that M. & T. Kilcawley, of Sligo, started the foundry in 1915, and two years later his late father joined the board of directors. At that time only 20 to 25 workers were employed, but to-day there was employment for about 80. Mr. Frame said that recent developments were the establishment of a holloware industry and the manufacture of grates.

AFTER A LONG SERIES of experiments, Pilkington Brothers, Limited, have produced a glass with both surfaces lightly obscured, which successfully mitigates the nuisance of reflection without actually reducing the amount of light reflected. It is available in substances 2.6/3.2 mm. and upwards, and at present in sizes up to 18 in. by 12 in., and can be obtained toughened if required. Bent glass to approved curves is available as well as flat glass. The glass is particularly suitable for meter and gauge glasses where the observer is positioned at some distance from the instrument panels and is unable to move into a position to avoid reflections. The glass only functions satisfactorily so long as the dial face of the instrument is reasonably close behind the glass.

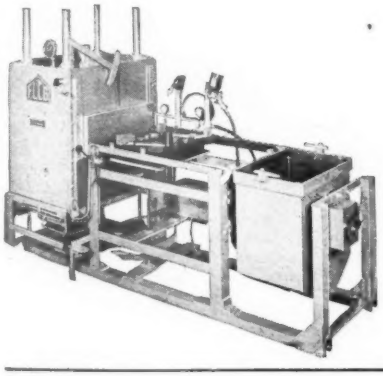
THE GLASGOW FIRM of Stewart & Mackenzie, Limited, Riverford Road, recently demonstrated in their engineering shop a tool of unusual design that files or saws metals up to the hardness of tungsten-carbide. The machine, produced by Rockwell Machine Tool Company, Limited, London, represents an important advance in precision work on hard metals. Where hitherto orthodox practice has been grinding, the Thiel Produro cuts internally or externally by means of a file into which fine diamond particles have been impregnated. This durable, pencil-shaped tool revolves at up to 12,000 r.p.m., at the same time moving up and down in the material. Another machine tool now being shown in Scotland for the first time is a Thiel universal milling machine.

MR. J. A. MARTIN, Northern Ireland regional manager of George Cohen, Sons & Company, Limited, was the speaker at a meeting of the Northern Ireland Group of the Purchasing Officers' Association. His interesting talk was on "Handling Scrap in Industry." Mr. Martin stated that although cast-iron scrap was largely transformed in Belfast and other Ulster town foundries into castings, the amount available was so great that quantities of the region's scrap metal were shipped to England. In fact, the firm which he represented shipped an average of 500 tons of scrap steel each week while concurrently at least 2,000 tons of non-ferrous metal per year were similarly shipped. The probable consumption of steel scrap in Great Britain this year, he estimated, would reach a total of about 4,000,000 tons.

SPEAKING at the annual dinner in Birmingham on November 5 of the Midland Section of the Institute of Transport, Mr. C. T. Brunner, vice-chairman of the British Road Federation and a past-president of the Institute, said that the economic life of the nation was threatened if the present road chaos was allowed to become worse confounded. Seventy per cent. of all goods made in Britain went by road at least for part of their journey and at present heavy goods vehicles were trundling along in a sort of somnambulistic trance on roads scarcely fit for stage coaches. The journey time between London and Birmingham averaged 7 hours for heavy goods vehicles and 5½ hours for light vehicles, Mr. Brunner said. These schedules were not entirely due to the badness of the roads but partly to the archaic speed limit of 20 m.p.h. imposed by the legislature. Britain's chances of holding and developing export markets were directly related to this problem of roads. "Transport productivity" is a phrase which really means something on the Continent and in America, Mr. Brunner said, and asked "When are our own authorities going to follow their example?"

SHELL MOULDING AT LOW COST

The Shelmolda 'Duplus' is low in first cost, economical to operate and costs little to maintain. Its design is simple and straightforward, yet it has the advantages of more complicated and costly apparatus. Operation is semi-automatic, with all the strenuous work carried out mechanically. The patent oven is thermostatically controlled and gives the machine a proved capacity of 50/60 moulds per hour. Pattern plates measure 24in. by 16in. and the maximum depth of pattern is 5in. Floor space required is 8ft. 6in. by 3ft. 3in. and the machine is operated by one man. Cost of the Shelmolda 'Duplus' is £575; delivery is 8 to 10 weeks.



Shelmolda

DUPLUS

PATENT APPLIED FOR

FAIRBAIRN LAWSON COMBE BARBOUR LTD

LEEDS, ENGLAND. Telephone : Leeds 32041

Raw Material Markets

Iron and Steel

With many sections of the trade enjoying a period of brisk business, output of castings is larger than for some time past. While the improvement is centred round the engineering and speciality foundries, the jobbing foundries have stepped up their outputs and the textile foundries also report improved business. The light-castings trade, however, has not yet felt the benefit of the improved trade conditions in other sections. Orders for light castings are certainly much more numerous than they were, but the position is still far from satisfactory.

So far as supplies of raw materials are concerned, the foundries are generally able to satisfy their immediate requirements in pig-iron, although foundries using chiefly the low- and medium-phosphorus irons—notably the engineering and speciality foundries—are still having to utilize other irons in their mixtures, with a consequent increase in production costs. Apart from the higher silicon grades, hematite for these foundries is coming forward fairly well, while the demand for refined irons is being met. Production of high-phosphorus pig-iron would appear to be fully adequate. Scrap supplies are generally sufficient for current needs. Foundry cupola coke and furnace coke for heating purposes are coming forward fairly satisfactorily, and there is no difficulty in covering requirements of ganister, limestone, and firebricks.

The re-rollers are busily engaged on home and overseas business for small bars, light sections, sheets, wire rods, and strip. Orders on hand will keep them fully employed for some time, and fresh business is forthcoming to replace completed orders. Most of the re-rollers can now only accept new orders for deferred delivery. Stocks of steel semis have become depleted; in consequence, there is a heavy demand on both English and Welsh steelworks for supplies of billets and slabs. Deliveries from home sources are not being made at the required rate, particularly in the case of billets of 2 in. to 3 in. square, while there has recently been no increase in supplies from overseas. Should the present scarcity of deliveries from home steelworks continue, consideration may have to be given to a resumption of supplies from the Continent.

Non-ferrous Metals

With the termination of the Australian dock strike it is hoped that the markets will at least be free for a time from factors hindering the movement of metal. As far as copper is concerned, however, the situation in Rhodesia remains uncertain. In Chile production seems to be going along smoothly and copper is now coming forward freely to this country. Nevertheless, scarcity continues; although the London quotation dropped sharply last Friday, the undertone was steady throughout the week.

On balance, cash closed £2 10s. lower, but three months gained £3 and the backwardation narrowed to £11, which was a welcome development. It is rather surprising that the premium for cash is no more than £11, for Metal Exchange stocks, estimated at about 850 tons, are still very low.

In the United States the domestic price continues at 30 cents, delivered Valley, but the supply situation is still tight, in spite of stockpile releases totalling some 51,000 short tons. This is mostly in cathode form and time and money are required to turn it into the shapes required by the trade. American copper scrap is still selling over here, for the London price of electro rules some £30 above the U.S. parity.

Zinc was firm in London last week, prompt advancing by 15s. and forward by 12s. 6d. Stocks are comfortable here and the strike-bound parcels are coming forward; demand is steady, but not spectacular. The statistical position in the States has improved: stocks in producers' hands at October 31 were nearly 23,000 tons down, at 152,000 short tons, according to figures released by the American Zinc Institute. Smelter production was up by about 7,000 tons to 67,000 tons. Since May 31 there has been a drop in producers' stocks of nearly 58,000 short tons, but at that time they were very large.

Lead in London showed little change, being 5s. up prompt and £1 forward. With an easier supply position values should now ease somewhat. Tin continued to lose ground and was £7 lower for both positions at the close of business on Friday.

Official metal prices were as follow:—

COPPER, Standard—*Cash:* November 11, £280 to £282 10s.; November 12, £274 to £275; November 15, £277 to £277 10s.; November 16, £279 to £279 10s.; November 17, £278 10s. to £279.

Three Months: November 11, £268 to £268 10s.; November 12, £262 10s. to £263; November 15, £266 to £267; November 16, £267 to £267 10s.; November 17, £267 to £267 10s.

TIN, Standard—*Cash:* November 11, £717 10s. to £718; November 12, £718 to £718 10s.; November 15, £722 to £723; November 16, £724 to £725; November 17, £729 10s. to £730 10s.

Three Months: November 11, £714 10s. to £715; November 12, £715 10s. to £716; November 15, £718 to £719; November 16, £719 to £720; November 17, £724 10s. to £725 10s.

ZINC—*First half November:* November 11, £81 15s. to £82; November 12, £81 15s. to £82; November 15, £81 12s. 6d. to £81 15s. *Second half November:* November 16, £81 17s. 6d. to £82; November 17, £81 5s. to £81 10s.

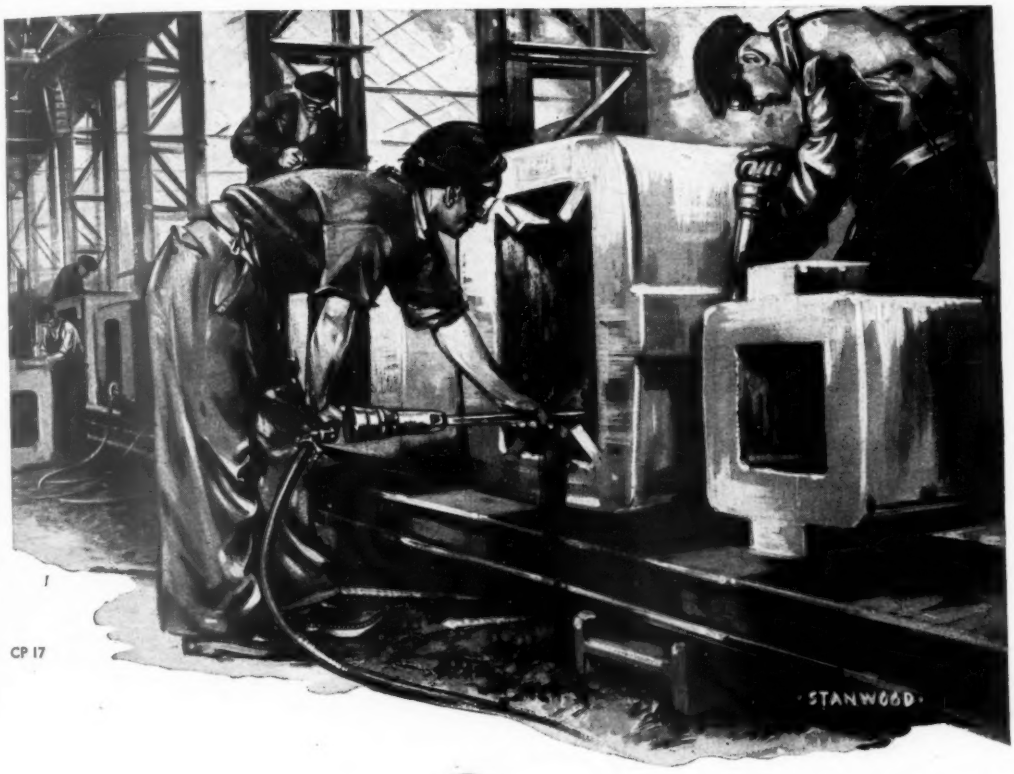
First half February: November 11, £81 15s. to £82; November 12, £81 15s. to £82; November 15, £81 12s. 6d. to £81 15s. *Second half February:* November 16, £81 17s. 6d. to £82; November 17, £81 5s. to £81 10s.

LEAD—*First half November:* November 11, £111 to £111 5s.; November 12, £110 to £110 10s.; November 15, £111 to £111 5s. *Second half November:* November 16, £109 15s. to £110 5s.; November 17, £109 10s. to £109 15s.

First half February: November 11, £105 5s. to £105 10s.; November 12, £104 5s. to £104 10s.; November 15, £104 to £104 5s. *Second half November:* November 16, £105 10s. to £105 15s.; November 17, £105 5s. to £105 10s.

Clyde Shipbuilding

Orders for four more ore-carrying ships have been placed with British shipyards and three of these will be constructed on the Clyde. Lithgows, Limited, Port Glasgow, will build two ore-carriers for a company now in process of formation. Under a previous contract they have under construction four ore-carrying motor ships, each of 14,000 tons dw, for the St. Andrew's Shipping Company, Limited, Glasgow. Charles Connell & Company, Limited, Glasgow, will build the third ore-carrying vessel, which is to the order of Scottish Ore Carriers, Limited. The fourth ship will be built by Smith's Dock Company, Limited, Middlesbrough. With these latest orders there are now 12 ore-carrying vessels on order—seven on the Clyde and five on the North-East Coast of England.



MORE OUTPUT WITH CP TOOLS IN THE FOUNDRY

It is probably only the foundry workers themselves who can describe the perfect balance and control so characteristic of CP Chipping Hammers, but it is the whole foundry which benefits from the extra output and better workmanship that CP tools help them to achieve. And the same applies to CP Grinders, particularly Hicycle Electric Grinders which so many up-to-date foundries are installing as a means to lower costs and higher production.

FOR THE RIGHT APPROACH . . .

THE RIGHT EQUIPMENT

CALL IN Consolidated

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Current Prices of Iron, Steel, and Non-ferrous Metals

(*Delivered unless otherwise stated*)

November 17, 1954

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2:—Middlesbrough £14 19s. 6d.; Birmingham, £14 12s. 9d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £17 5s. 9d., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £17 16s. 9d.

Scotch Iron.—No. 3 foundry, £17 9s. 6d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £18 19s. 6d.; South Zone, £19 2s. 0d.

Refined Malleable.—P, 0.10 per cent. max.—North Zone, £19 19s. 6d.; South Zone, £20 2s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent.:—N.-E. of England (local iron), £17 14s. 6d.; Scotland (Scotch iron), £18 1s. 0d.; Sheffield, £18 19s. 0d.; Birmingham, £19 6s. 6d.; Wales (Welsh iron), £18 1s. 0d.

Basic Pig-iron.—£15 10s. 6d. all districts.

FERRO-ALLOYS

(*Per ton unless otherwise stated, delivered*)

Ferro-silicon (6-ton lots).—40/55 per cent., £42 0s. 0d., basis 45 per cent. Si, scale 17s. per unit; 70/84 per cent., £65 0s. 0d., basis 75 per cent. Si, scale 18s. per unit.

Ferro-vanadium.—50/60 per cent., 23s. 8d. to 25s. 0d. per lb. of V.

Ferro-molybdenum.—65/75 per cent., carbon-free, 10s. 0d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., carbon-free, £185 0s. 0d. to £195 0s. 0d. per ton; 38/40 per cent., £251 0s. 0d. to £270 0s. 0d. per ton.

Ferro-tungsten.—80/85 per cent., 13s. 10d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 16s. 10d. per lb. of W.

Ferro-chrome (6-ton lots).—4/6 per cent. C, £75 0s. 0d. to £80 0s. 0d., basis 60 per cent. Cr, scale 25s. 0d. per unit; over 6 per cent. C, £74 0s. 0d. to £76 0s. 0d., basis 60 per cent. Cr, scale 24s. 0d. per unit; 2 per cent. C,* 1s. 7½d. per lb. Cr; 1 per cent. C,* 1s. 8d. per lb. Cr; 0.15 per cent. C,* 1s. 9½d. per lb. Cr; 0.10 per cent. C,* 1s. 9¾d. per lb. Cr; 0.06 per cent. C,* 1s. 10d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 6½d. to 7s. 1d. per lb.

Metallic Manganese.—93/95 per cent., carbon-free, £225 0s. 0d. to £232 0s. 0d. per ton; 96/98 per cent., £255 0s. 0d. to £262 0s. 0d. per ton.

Ferro-columbium.—60/75 per cent., Nb + Ta, 52s. 6d. to 70s. 0d. per lb., Nb + Ta.

Ferro-manganese (home).—78 per cent., £54 15s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft, u.t., £25 12s. 6d.; tested, 0.08 to 0.25 per cent. C, £26 12s. 6d.; hard (0.41 to 0.60 per cent. C), £28 0s. 0d.; silico-manganese, £33 16s. 0d.; free-cutting, £28 16s. 6d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £32 12s. 0d.; silico-manganese, £34 17s. 6d.

* Average 68-70 per cent. Cr.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.25 per cent. C, £29 16s. 0d.; basic, hard, over 0.41 up to 0.60 per cent., C, £30 16s. 0d.; acid, up to 0.25 per cent. C, £33 0s. 0d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £31 1s. 6d.; boiler plates (N.-E. Coast), £32 9s. 0d.; floor plates (N.-E. Coast), £32 10s. 6d.; sectional material, N.-E. Coast, £29 4s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., untested, £32 7s. 0d.; flats, 5 in. wide and under, £32 7s. 0d.; hoop and strip, £33 9s. 0d.; black sheets, 17/20 g., £42 1s. 0d.; galvanized corrugated sheets, 24 g., £51 8s. 6d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £53 8s. 0d.; nickel-chrome, £75 2s. 0d.; nickel-chrome-molybdenum, £84 13s. 6d.

NON-FERROUS METALS

Copper.—Cash, £278 10s. 0d. to £279 0s. 0d.; three months, £267 0s. 0d. to £267 10s. 0d.; settlement, £279 0s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 31¾d. per lb.; wire, 308s. 3d. per cwt. basis; 20 s.w.g., 339s. 6d. per cwt.

Tin.—Cash, £729 10s. 0d. to £730 10s. 0d.; three months, £724 10s. 0d. to £725 10s. 0d.; settlement, £730 10s. 0d.

Zinc.—Second half November, £81 5s. 0d. to £81 10s. 0d.; second half February, £81 5s. 0d. to £81 10s. 0d.

Zinc Sheets, etc.—Sheets, 15 g. and thicker, all English destinations, £112 0s. 0d.; rolled zinc (boiler plates), all English destinations, £109 15s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £96 0s. 0d.

Lead (Refined Pig).—Second half November, £109 10s. 0d. to £109 15s. 0d.; second half February, £105 5s. 0d. to £105 10s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 25¾d. per lb.; rods, drawn, 35d.; sheets to 10 w.g., 284s. 0d. per cwt.; wire, 32¾d.; rolled metal, 270s. 3d. per cwt.

Brass (Brazing).—BS1400, B3 (65/35), £189; B6 (85/15), £235; BS249, £190.

Brass (High Tensile).—BS1400, HTB1 (30 tons), £219; HTB2 (30 tons), £230; HTB3 (48 tons), £240.

Gunmetal.—RCH, 3/4 per cent. tin, —; BS1400, LG2 (85/5/5/5), £235; LG3 (86/7/5/2), £244; G1 (88/10/2/½), £311; (88/10/2/1), £300.

Phosphor Bronze.—BS1400, PB1 (AID released), £324 per ton.

Phosphor Bronze Strip, etc.—Strip, 399s. 6d. per cwt.; sheets to 10 w.g., 422s. 0d. per cwt.; wire, 49½d. per lb.; rods, 43d.; tubes, 41¼d.; chill cast bars: solids 43½d., cored 44½d. (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 5d. per lb.; round wire, 10g. in coils (10 per cent.), 3s. 10¼d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 3s. 9¼d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 3d. per lb. Antimony, English, 99 per cent., £210 0s. 0d. Quicksilver, ex-warehouse, £110 0s. 0d. to £111 0s. 0d. Nickel, £483 0s. 0d. Aluminium, ingots, £156 0s. 0d.; aluminium bronze (BS1400), AB1, £285; AB2, £290. Solder, brazing, BS1845, 2s. 3d. lb.; granulated, 2s. 6d. lb.

Forthcoming Events

NOVEMBER 22

Institution of Production Engineers

Sheffield graduate:—"Factory Inspector and the Production Engineer," by D. E. Jones, 6.30 p.m., at the Royal Victoria Station Hotel, Sheffield.

NOVEMBER 23

Purchasing Officers' Association

Sheffield branch:—Debate "That the Sales Representative is Unnecessary in Industry Today," 7 p.m., in the Grand Hotel.

NOVEMBER 24

Institution of Production Engineers

Shrewsbury section:—"Patents and Registered Design," by S. J. Parker and "Human Safety in Engineering," by B. G. Williams, 7.30 p.m., at the Shrewsbury Technical College.

NOVEMBER 25

Institute of Vitreous Enamellers

Midland section:—"Rubber-lined Mills: their use to the Industry," by R. W. H. Bennett, at the Birmingham Exchange & Engineering Centre, Stephenson Place, Birmingham, 2.

Institute of British Foundrymen

Northampton and district:—"Production of Malleable Castings," by H. Hayden, 7.30 p.m., at the Plough Hotel, Northampton.

Chemical Club

"Our Economic Position," by Sir Graham Cunningham, K.B.E., 6 p.m., at 2, Whitehall Court, London, S.W.1.

Incorporated Plant Engineers

Sheffield and district branch:—"Compressed Air in Industry," 7.30 p.m., at the Grand Hotel, Sheffield.

Institute of Metals

Birmingham local section:—"Working of Metals," by J. G. Wistreich, 6.30 p.m., at the James Watt Memorial Institute, Great Charles Street.

NOVEMBER 25 AND 26

Institute of Metals

General meeting, for the discussion of papers, at 4, Grosvenor Gardens, London, S.W.1.

NOVEMBER 26

Manchester Association of Engineers

"Submarine Telegraph and Telephone Cables," by F. Mattingley, 6.45 p.m., at the Engineers' Club, Albert Square, Manchester, 2.

Institute of Industrial Supervisors

Newark-upon-Trent section:—Film show arranged by Ruston & Hornsby, Limited, Lincoln, at their works.

Institute of British Foundrymen

London branch:—Ladies' Night. Annual Dinner, Dance and Cabaret, 6.30 p.m., for 7 p.m., at the Cafe Royal, Regent Street, W.1.

Changed Date of Meeting. The meeting of the Birmingham branch of the Institute of British Foundrymen, which was scheduled for November 15, will actually take place on November 24 (7.15 p.m.), when Dr. D. V. Atterton will lecture in the James Watt Memorial Institute, Great Charles Street, on "Hardening of Moulds and Cores by the CO$_2$ Process." Apologies are extended to all who may have been confused by the incorrect announcement of the meeting under FORTHCOMING EVENTS in last week's issue.

THE NEXT CONVENTION of the American Foundrymen's Society will be held in Houston, Texas, from May 23 to 27 inclusive.

AN ORDER worth over £300,000 has been booked by the Power-Gas Corporation, Limited, Stockton-on-Tees, for a domestic-gas making plant at Rotherhithe. The plant will have a production capacity of 12,000,000 cub. ft. per day. A similar plant of twice the size is now being built by the same company in Japan.

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BIRMINGHAM, 2. 39, Corporation St., Midland 3375/6
LIVERPOOL, 2. 13, Rumford St., Central 1558
GLASGOW, C.2. 93, Hope Street, Central 9969

CLASSIFIED ADVERTISEMENTS

PREPAID RATES: Twenty words for 5s. (minimum charge) and 2d. per word thereafter. Box Numbers 2s. extra (including postage of replies).

Advertisements (accompanied by a remittance) and replies to Box Numbers should be addressed to the Advertisement Manager, Foundry Trade Journal, John Adam House, 17/19, John Adam Street, Adelphi, London, W.C.2. If received by first post Tuesday advertisements can normally be accommodated in the following Thursday's issue.

SITUATIONS WANTED

ALUMINIUM GRAVITY DIECASTINGS. Works Manager of a Light Alloy foundry producing large quantities of aluminium gravity diecastings, at present complete charge factory, desires change. Progressive executive position of similar capacity desired, based on results. Midlands area only.—Box AG 893, FOUNDRY TRADE JOURNAL.

FOUNDRYMAN/METALLURGIST (45), 15 years manager, desires position of responsibility. Very wide experience general engineering castings up to 25 tons. High-duty and grey iron, also non-ferrous. —Box FM877, FOUNDRY TRADE JOURNAL.

WORKS FOUNDRY MANAGER (46). Ferrous or Non-Ferrous Sand; Gravity and Pressure Die; Shell Moulding; Jobbing or Mechanized Foundries; Machine, Assembly, and Fitting Shops. Practical and Technical training specialist Aluminium Alloys; desires change. Accustomed to full control. Box WF882, FOUNDRY TRADE JOURNAL.

FOUNDRY EXECUTIVE, Iron and Steel, residing in Essex, seeks engagement. Practical and Technical experience through every stage of production, General and Mechanized, from the drawing board to despatch from works, including simple machining and assembly. Have Sales experience; would consider representation. Car owner, with phone. M.I.B.F. ADVERTISER, Kent Cottage, Hockley 160, Essex.

ASSISTANT FOUNDRY MANAGER. 28. of foundry producing 200 tons light/medium iron castings per week, wishes to become associated with a company requiring a man with wide experience, ability and unbounded enthusiasm. Salary to be based strictly on results. Box A.F.856, FOUNDRY TRADE JOURNAL.

YOUNG FOUNDRYMAN (30), desires change. A.M.I.B.F., full Tech. Cert., City and Guilds, foundry practice and science. Inter. Metallurgy. Experience at controlling labour. Anything considered relating to Foundry Industry, provided post is progressive. London area preferred.—Box YF874, FOUNDRY TRADE JOURNAL.

FOUNDRY METALLURGIST (28). Metallurgy Diploma, Melbourne Technical College; 12 years' experience, latterly Chief Metallurgist Australian foundry in charge laboratory cupolas, D.A. furnace and sand control. Two years' experience production S.G. iron. Arrives Britain October to gain further experience. Available for one year's employment. —Replies to Box FM760, FOUNDRY TRADE JOURNAL.

SITUATIONS WANTED—*contd.*

MECHANICAL and Electrical Foundry MAINTENANCE ENGINEER desires change, 40 years of age, life experience in Modern Plants. Well versed on heavy plants, workshop supervision and developments, 15 years of Executive Experience. Box MA832, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive or a woman aged 18-59 inclusive unless he or she, or the employment, is excepted from the provisions of the Notification of Vacancies Order, 1952.

FOUNDRY SUPERINTENDENT required for Jobbing Foundry making Iron Castings up to 10 tons and non-ferrous up to 5 cwts. Applicants must be conversant with latest Foundry practice and have knowledge of metallurgy and be able to take full control from Pattern Shop to Dressing Shop. Age around 30 to 40. Rochdale district. Canteen facilities. State Salary required. Box FS901 FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER with first-class practical experience required for Midland non-ferrous and ferrous foundry producing large and small castings. Reply giving all details of experience, etc., to Box FM899, FOUNDRY TRADE JOURNAL.

FOUNDRY SUPERINTENDENT (35/45) required for a modern Black Country Foundry; must have first-class practical experience and be fully conversant with modern Foundry practice. Good salary; pension scheme; canteen; 5-day week. Apply in confidence giving full particulars of experience: Managing Director, Box FS883, FOUNDRY TRADE JOURNAL.

FOREMAN required for bronze foundry producing castings up to 2 tons. Staff appointment with bonus on production. Apply in writing CHARLES CARR LTD., Grove Lane, Smethwick 40.

J. STONE & CO. (CHARLTON) LTD.
LONDON, S.E.7

invite applications for the position of

MANAGER
OF THE
GRAVITY DIE CASTING DIVISION

This is a senior Executive post offering full scope for technical and business ability. Only men with first-class experience, particularly of die design and metal technique, and able to command a four figure salary should apply. Excellent prospects, superannuation, etc.

Applications should be sent to the GENERAL MANAGER, and will be treated in absolute confidence.

SITUATIONS VACANT—*contd.*

EXPERIENCED FOUNDRY FOREMAN for Steel and Iron Foundry in Wolverhampton district. Experience on planning and methods control essential. Must have had foundry apprenticeship and technical training. Write stating age, experience and salary required. Box EF914, FOUNDRY TRADE JOURNAL.

METAL PATTERNMAKERS required with Toolroom experience for new Factory Southern Counties. Housing accommodation available. Highest rates. First Class men only need apply. UNIVERSAL PATTERN Co. (LONDON) LTD., 269, Rotherhithe New Road, London, S.E.16.

PATTERNMAKERS required, used to first-class Wood and Metal work. Excellent conditions, canteen, music while you work, etc., top wages and bonus, by the oldest (85 years) established firm, with the absolute highest reputation. Main suppliers for many years to all firms of importance in the entire country and the finest Plant and Equipment in the world.—Apply WRIGHT & PLATT, LTD., the World's Largest Engineering Patternmakers, Irving Street, Birmingham. Vacancies at Manchester branch. Apply Springfield Lane Works, Salford, 3.

ARCHITECTURAL Metal Workers and Founders require ASSISTANT MANAGER. Preference given to applicants with several years experience in Foundry work (ferrous and non-ferrous), practical and theoretical, including estimating. Progressive position to right man. State full particulars, where trained, also age, etc. Box AS881, FOUNDRY TRADE JOURNAL.

LABORATORY. Young man (inter B.Sc. or National Certificate Standard) required for Malleable Iron Foundry Laboratory. Apply by letter in first instance giving particulars of experience, age, etc., to H. W. LINDOP & SONS LIMITED, Pleck Road, Walsall.

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